AUGUST 1961

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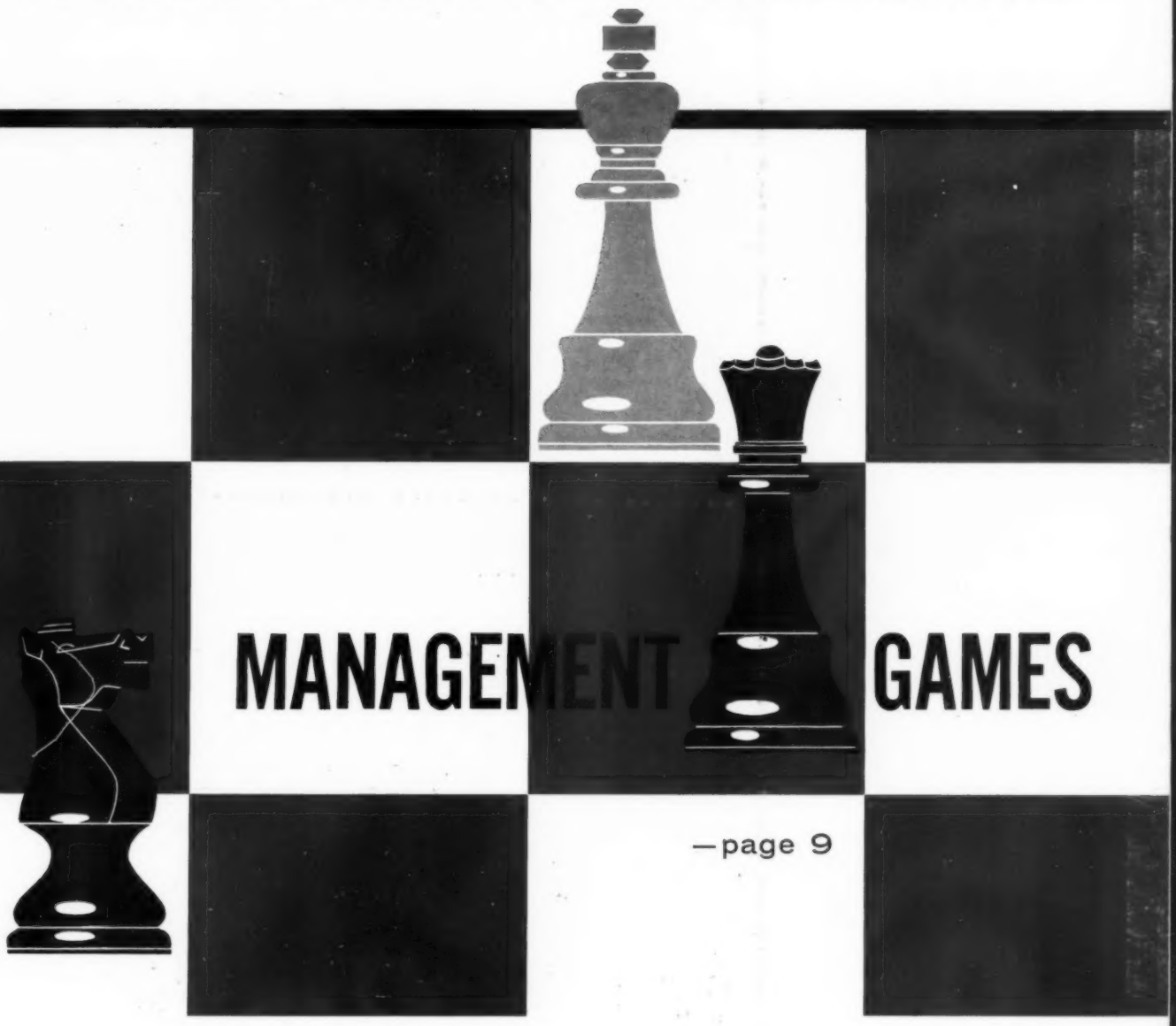

MANAGEMENT GAMES

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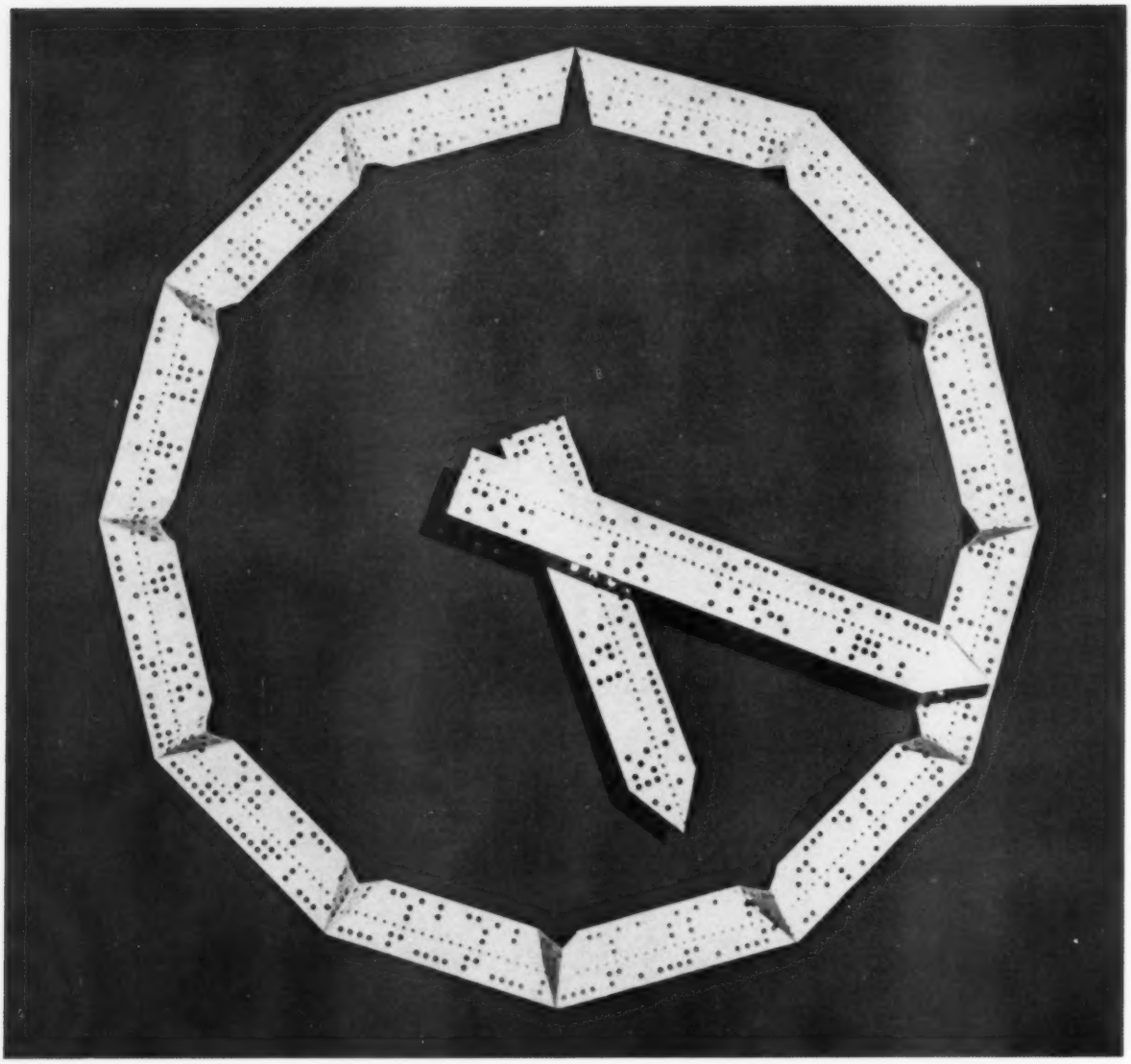

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OBSERVATIONS . . .
from the publisher

WE HAVE ONLY PRAISE TO OFFER those responsible for the recent successful NMAA Conference held in Toronto. The fact that it was so well attended (over 2,500 conferees) is perhaps the most graphic proof of the appealing informational menu offered. Any registrant who did not leave better informed could blame only himself.

Seminars were exceptionally well attended partly because the subject was so compelling, partly because of the expert direction, and partly because entertainment features of the conference were not allowed to interfere with business sessions. We were especially pleased to note that the seminar panels in most cases had representatives from equipment users, manufacturers and consultants, providing a good balance of views. Some of our readers may recall that we were critical of the direction of the 1960 seminars.

Most encouraging of all, we believe, was the emphasis the national organization is giving education in all its phases. They are expanding courses given in local chapters, prodding the universities to greater effort and pushing for certification of data processing specialists. We have felt from the first, and have so indicated on several occasions, that the primary objective of NMAA should be to educate its members in improved management skills and to further the enlightenment of top management with its views of the data processing function.

We hope that NMAA will carry their educational efforts even beyond the present frontiers and offer an expanded educational direction through their local chapters to their members. And beyond their membership, to encourage young people to enter the field of data processing.

The data processing specialist wages a constant battle with time in trying to keep knowledgeable. This was well indicated by W. P. Livingston in his inspired keynote talk when he suggested that "as fast as we raise ourselves to a new level of understanding, we find ourselves looking up at new heights to comprehend."

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Thirty million pieces of paperwork never go into files. With the evolution of new management concepts in records administration, microfilm and magnetic tape furnish both digital computations and facsimile support.

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BURT NANUS *(The Computer Manufacturer's Role in Management Games)* is manager of special educational projects at the Univac division of Sperry Rand Corporation. Among his responsibilities is supervision of the management games program, a field in which he became interested while serving as management development representative on the corporate staff in 1959.

He has written and spoken widely on the subject and is a co-author of a new book in this area (see *Book Shelf*, page 56).

Mr. Nanus received a mechanical engineering degree from the Stevens Institute of Technology, and a master of science in industrial management from M. I. T.

CHARLES H. SIMPSON *(Use the Editors You Have!)* is manager of data processing for the Commission on Professional and Hospital Activities. He attended Michigan State University where he majored in accounting. He has been in the field of medical research with the Commission for more than five years, and is now engaged in directing the conversion of the organization's punched card installation to a computer operation. He is a member of the Central Michigan Chapter of the National Machine Accountants Association.

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NEWS SUMMARY

BANKING

Pittsburgh National Bank has ordered two GE 225 systems which will be used for deposit, installment loan, corporate trust and personal trust accounting.

Seven banks in San Antonio and two banks in Texas City have formed cooperative electronic computer user groups. Both groups have ordered Burroughs 251 Visible Record Computers.

American Fletcher National Bank & Trust has completed its new data processing center and has its IBM 1401-1412 system operational.

Eastern National Bank expanded installment credit operations 30 percent by using NTC accounting service.

ODDS AND ENDS

Some ITT engineer-scientists expect international communications traffic to increase 200 percent by 1970. To help handle this traffic it is expected that communications satellites will become operational by that date.

RCA's president, J. L. Burns, foresees the vacationing businessman of 1970 packing a small portable computer in his luggage. The computer could be plugged into a telephone outlet and dialed to his office's data processing system for contact with what is going on in the business.

Univac delivered its 300th solid state computer in May.

Seven forms control specialists inaugurated a Forms Forum to swap information and ideas about forms; the forum was sponsored by Transkrit Corporation.

FOREIGN

El-Tronics, Inc. has purchased control of El-Tronics Ltd. of London, England.

Digitronics has agreed that Mitsui & Co., Ltd. shall be its distributor of electronic converters in Japan.

NEW USES AND USERS

American Mutual Liability Insurance Company, of Massachusetts, has most of its automobile liability and property damage policies on the Honeywell 800.

Carnegie Institute of Technology Computation Center has installed a Bendix G-20.

A. C. Nielsen Company, Chicago, will install a Honeywell 800 system.

The University of Miami will use an RCA 301 for tighter budget control and student reports.

Aetna Insurance Company, of Connecticut, has ordered a Farrington Selected Data Page Reader, an optical scanner.

When Purdue University dedicated its Univac Solid State 80, it received two Univac Graduate Fellowships from Sperry Rand; these fellowships are to be used for advanced study in electronic data processing.

Douglas Aircraft converted a national industrial data transmission system from punched card to magnetic tape by installing a Collins Radio Company Kinetape system. This system links the missile plant in Charlotte, North Carolina with the computer center in Culver City, California.

(continued on next page)

In May, The Service Bureau Corporation opened its first banking center for MICR processing, in Los Angeles.

SERVICE CENTERS

RCA's new computer center in San Francisco was opened with Pacific Coast Stock Exchange as its first customer.

EXPANDING

Bendix Semiconductor division has been formed as a new group, with new headquarters at Holmdel, New Jersey.

C-E-I-R's latest mergers are with American Research Bureau and ARB Surveys.

System Development Corporation has established a Washington division which is working with the Department of Defense to develop systems of communications control and damage assessment.

MILITARY

ITT Federal Laboratories have a contract to design a unique three-dimensional display for the U. S. Air Force research teams. Use of 3-D displays will probably be made in manned weapon systems, with possible applications in air traffic control, missile tracking, anti-submarine warfare and related fields.

Strategic Air Command is using an NCR 304 computer system for finding the best qualified people, and determining number needed, in world-wide SAC assignments.

Univac, St. Paul, claims the nation's reliability record for its Athena (radio-inertial ground guidance computer), developed for USAF's Titan ICBM program. Out of 14 Athenas, with total operating time of 41,000 hours up to May 1, there were only 64 guidance-affecting failures; a composite mean time to failure of nearly 640 hours.

The Department of Defense has ordered a CDC 1604 computer for its new atomic damage assessment program. A display system was ordered from Thompson-Ramo-Wooldridge Corporation to work with the other units.

Air Force Systems Command announced that Armour Research was awarded a two million dollar contract to examine all military electronic devices, ranging from hand-held walkie talkies to radars, for possible mutual interference.

Philco Corporation was awarded a $35,800,000 contract for continued development of command and control subsystems for AF space and satellite programs.

General Electric's Heavy Military Electronic Department was awarded a $36 million contract for production of the USN's AN/SPS-30 long range, height finding radar, for shipboard use.

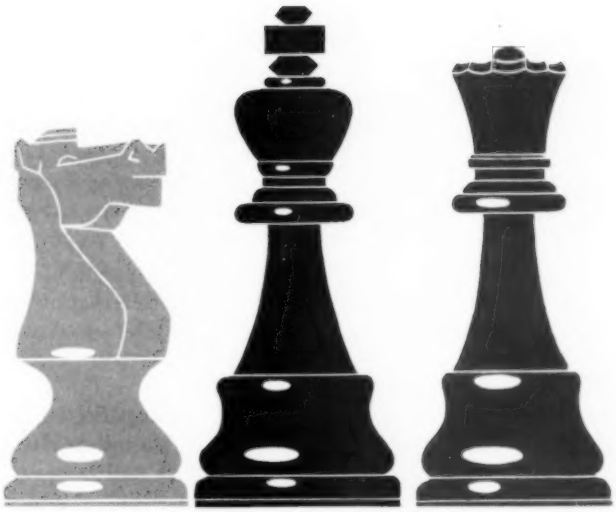
Over one million dollars will go to Bendix for submarine automatic maneuvering control systems to be used for Polaris firing and attack type submarines.

Control Data Corporation will make eight Digital Geoballistic Computers for the Polaris submarine Mark 84 Fire Control system.

USAF, Wright Patterson AFB, has awarded a contract for bionic component and network simulation on an IBM 7090 to The Service Bureau Corporation.

The Military Petroleum Supply Agency expects to save $5 million of the annual $400 million cost of fuel by analyzing bids by computer. This is a Navy developed program for the Department of Defense.

COVER FEATURE



Why Management Games?

Do results warrant busy executives' time?

By Francis M. Webster Jr.

TO MOST EXECUTIVES the idea of a management game is very new. Only in the last four or five years have these games received appreciable publicity. But actually the basic ideas have been around for some time. Before we explore the history of management games let us consider what is a management game, or at least, what are some of the elements of a management game.

First, what is a game? One definition is: "A contest, physical or mental, according to a set of rules, undertaken for amusement or for a stake." This definition is at least partly applicable to business. Business is certainly a contest undertaken for a stake. It requires physical and mental effort and there are rules. These rules range from very precise rules of law, which have been thoroughly tested, to the sometimes very ill defined rules of behavior as are occasionally evident in labor relations.

Management games are an attempt to capture the essence of such a contest without requiring the physical aspects, such as actual production and sales. By so doing it is possible to provide experiences similar to those found in an actual management situation without incurring the costs or using the great amount of time normally involved in gaining management experience. The value of such experience will be discussed later.

The model

A concept important to the understanding of management games is the model. Although the concept is not new, the use of the word is a recent development associated with economics and management science. In recognition of the complexity

of the real world, management scientists have adopted the term "model" as describing that set of simplifying assumptions which have been used to describe a set of relationships under discussion. The classical demand-supply relationship is an example of a model. In its simplest form it relies only on quantity to establish the relationship between prices. A slightly more complicated model introduces a qualitative relationship of time as we consider the differences in the short-run and the long-run. Neither of these have taken into consideration such factors as advertising, product styling, and economic activity. This is the important point to realize about models, they vary greatly in detail, complexity, and emphasis. They vary in detail and complexity in the same manner as the representatation of a human when depicted by a child as compared to a professional artist. They vary in emphasis as a Picasso differs from a Toulouse-Lautrec or a Van Gogh.

Why the publicity

Since the concept of management games has been in existence for some time one might wonder why they have suddenly become so popular.

The principal reason, of course, is the development of high speed computers. Surely computer manufacturers cannot deny having stressed the importance of the game as an indirect sales technique. They would be foolish had they not. However this does not diminish the value of the game. Computers have made possible the design of games hitherto unfeasible. This ability to make thousands of calculations per second has made possible the design of complex games without extending the playing time beyond reasonable lengths.

On the other hand, computers are not essential to the use of games. Many serious games have been developed for which calculations are performed manually. On a less serious scale, parlor games such as Monopoly are certainly management games, Monopoly being based essentially on real estate concepts. More recently a parlor game has been introduced which, in fact, is called "Management." When one considers even this simple game, in light of the possible values of games to be mentioned later, this parlor game assumes a reasonable degree of importance as an introductory experience.

Perhaps the most potent reason for the increased publicity given to management games is the appeal of realism made possible by computers. It is doubtful that a game such as Monopoly has ever been looked upon as a very valuable tool in teaching the skills, or art, of management. However, when a game is designed which embodies certain detailed and familiar characteristics of the soap industry or the petroleum business it suddenly becomes important to practical business men in these industries. As the degree of realism is increased (as the model becomes more sophisticated) the appeal becomes greater.

From a more optimistic point of view, management games have received a great deal of publicity because of some very real values. They open up intriguing and, perhaps, potent applications as tools in education, training, research, and precommitment decision simulation. It is because of this latter reason, I believe, that management games are going to grow in importance. It is also because of these future possibilities that the executive can afford, in fact must provide, the time necessary to develop and participate in games which will have a value to him in his job and to his company.

History

In tracing the development* of business management games we find they were a direct outgrowth of military war games. The earliest of these could no doubt be traced directly to such parlor games as chess. The importance of strategy to both chess and war is commonly understood. The earliest war games were very similar to chess in that they were played on a board. A significant development was made in 1798 when *New Kriegspiel* was introduced in Prussia. This was the first instance in which actual maps were used. Further developments were in the direction of greater realism.

Military games were adopted by the British Army in 1872 and shortly afterward by the United States, especially at West Point.

The Japanese utilized the game technique in planning and experiencing at an accelerated pace, the two year period from August 1941 to 1943. History reveals that many of the decisions arrived at via the game technique were, in fact, carried out by the Japanese.

There are presently several organizations in this country that specialize in war gaming under contract with the Defense Department. Perhaps the most well known of these is the Rand Corporation, and especially their efforts in logistical research for the Air Force.

The first business management game was developed by the American Management Association in 1956. It was an attempt to develop a game, similar to war games, which would provide business executives with experience in making decisions typical of those made in businesses. It was developed for five teams of from three to five persons selling a single product in a common mar-

*Note: For a detailed discussion of the history of management games see Cohen, Kalman J., and Rhenman, Eni, "The Role of Management Games in Education and Research," *Management Science*, Vol. 7, Number 2.

ket. Decisions are made on a quarterly basis with regard to selling price, marketing expenditures, research and development expenditures, capital expenditures, production rate, and market research information purchases. Besides being quite simple as regards to decision variables the players are limited in choice of values for each variable. The calculations necessary could be performed on a desk calculator but were also programmed on a computer since this reduced calculation time from 45 minutes to five minutes. The AMA has subsequently developed other models. (It is interesting to compare the decisions in the AMA game with those in the parlor game mentioned above which provides for decisions regarding purchase of raw material, production rate, selling price, borrowing of funds, capital expenditures, and sale of assets to a competitor.)

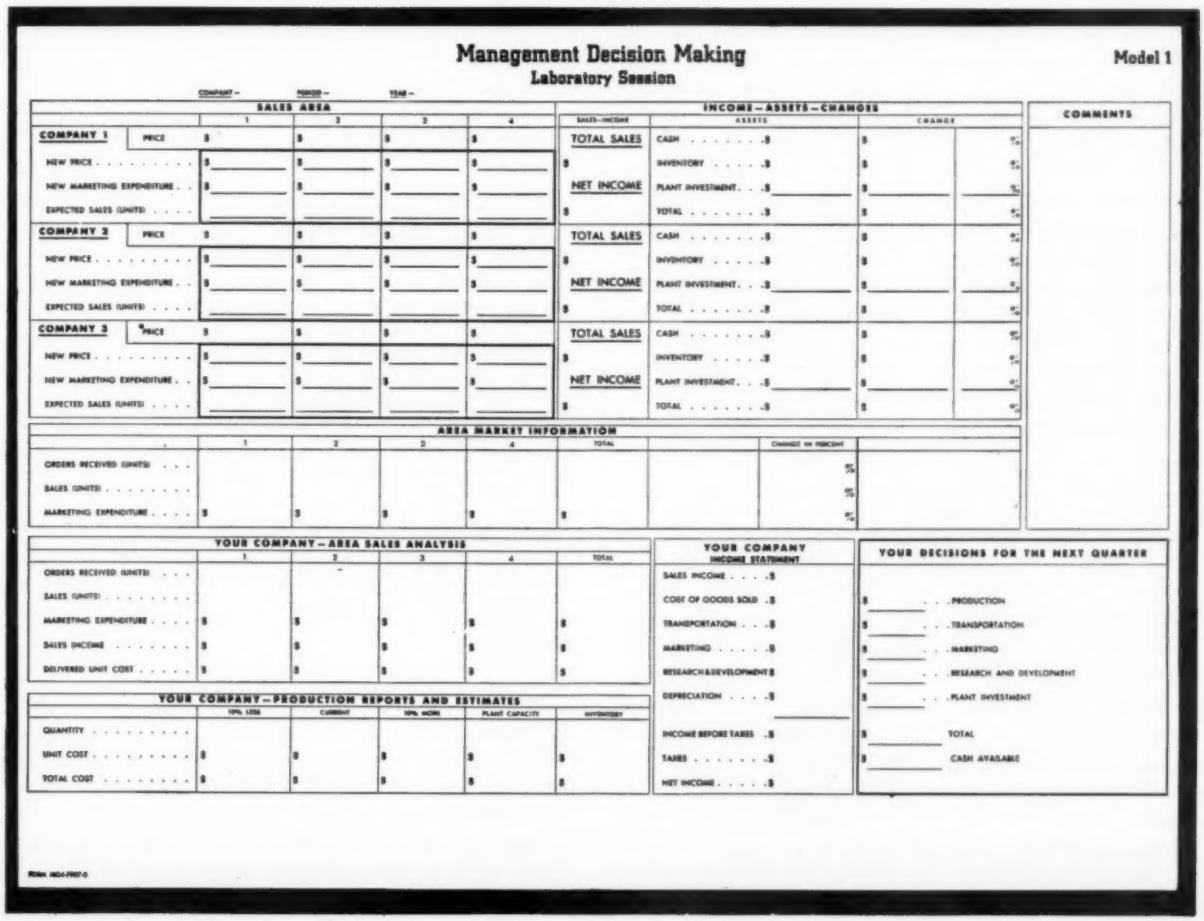
Another game of considerable interest is that of the Carnegie Institute of Technology. This game holds the distinction of being one of the most complex business games in existence. Each move, representing one month of simulated play, requires the team to record as many as 300 decisions. It is modeled after the detergent industry and provides for three teams. Rather elaborate steps have been taken to provide realism to the extent of having a faculty "board of directors" for each team. Although the required decisions can be arrived at in about three hours the students in the graduate program at Tech are allowed one week for a single move. Of course,this is in addition to the more conventional class work.

These two management games are characterized as being general management games. They combine all of the common business functions such as marketing, finance, and production. Other general management games have been developed by IBM, UCLA, Westinghouse Electric Corporation, Esso Standard Oil Company and many others. Some require computers while others may be calculated manually.

To give an idea of the information presented to the participants for each move, the form used in the IBM game is presented in Figure 1.

In addition to the general management games, a number of Functional Business Games have been developed. The AMA has developed a *Materials Management Simulation* in which the participants make decisions regarding raw materials, produc-

FIGURE 1.



Management Decision Making
Laboratory Session

Model 1

COMPANY — PERIOD — YEAR —

SALES AREA

	PRICE	1	2	3	4
COMPANY 1		$	$	$	$
NEW PRICE		$	$	$	$
NEW MARKETING EXPENDITURE		$	$	$	$
EXPECTED SALES (UNITS)					
COMPANY 2		$	$	$	$
NEW PRICE		$	$	$	$
NEW MARKETING EXPENDITURE		$	$	$	$
EXPECTED SALES (UNITS)					
COMPANY 3		$	$	$	$
NEW PRICE		$	$	$	$
NEW MARKETING EXPENDITURE		$	$	$	$
EXPECTED SALES (UNITS)					

INCOME — ASSETS — CHANGES

SALES — INCOME	ASSETS		CHANGE	
TOTAL SALES	CASH	$	$	%
$	INVENTORY	$	$	%
NET INCOME	PLANT INVESTMENT	$	$	%
$	TOTAL	$	$	%
TOTAL SALES	CASH	$	$	%
$	INVENTORY	$	$	%
NET INCOME	PLANT INVESTMENT	$	$	%
$	TOTAL	$	$	%
TOTAL SALES	CASH	$	$	%
$	INVENTORY	$	$	%
NET INCOME	PLANT INVESTMENT	$	$	%
$	TOTAL	$	$	%

COMMENTS

AREA MARKET INFORMATION

	1	2	3	4	TOTAL	CHANGE IN PERCENT
ORDERS RECEIVED (UNITS)						%
SALES (UNITS)						%
MARKETING EXPENDITURE	$	$	$	$	$	%

YOUR COMPANY — AREA SALES ANALYSIS

	1	2	3	4	TOTAL
ORDERS RECEIVED (UNITS)					
SALES (UNITS)					
MARKETING EXPENDITURE	$	$	$	$	$
SALES INCOME	$	$	$	$	$
DELIVERED UNIT COST	$	$	$	$	$

YOUR COMPANY — PRODUCTION REPORTS AND ESTIMATES

	10% LESS	CURRENT	10% MORE	PLANT CAPACITY	INVENTORY
QUANTITY					
UNIT COST	$	$	$	$	$
TOTAL COST	$	$	$	$	$

YOUR COMPANY INCOME STATEMENT

SALES INCOME	$
COST OF GOODS SOLD	$
TRANSPORTATION	$
MARKETING	$
RESEARCH & DEVELOPMENT	$
DEPRECIATION	$
INCOME BEFORE TAXES	$
TAXES	$
NET INCOME	$

YOUR DECISIONS FOR THE NEXT QUARTER

$	PRODUCTION
$	TRANSPORTATION
$	MARKETING
$	RESEARCH AND DEVELOPMENT
$	PLANT INVESTMENT
$	TOTAL
$	CASH AVAILABLE

tion scheduling and finished goods distribution to field warehouses. Others have been developed by Tulane University, General Electric, University of Pennsylvania, Boeing Airplane Company, and Burroughs.

Value of the game

Having reviewed the subject briefly we must now return to the original question, "Why should a busy executive be interested in business games?" After dismissing entertainment as a worthwhile objective it appears that the game has three essential values: educational, research, and precommitment decision simulation.

Educational

Business games are being used in a number of business schools as a regular part of the curriculum. Some use the general management approach while others use the game to illustrate a particular function. In addition several companies have developed games to help train their personnel.

What can be learned from playing a business game? First, let us make clear one thing which cannot be learned. You cannot learn the detail intricacies of a particular industry by playing a game not specifically designed for that purpose. A strategy which proves successful in playing the IBM game will not necessarily be successful in playing the Carnegie game, let alone in conducting the affairs of a going concern. It is possible to design a game which will convey certain specifically useful experiences to the participant. One company has done this to train their sales force. They designed a game based on well known characteristics of certain types of their customers and used their own sales tools. Thus the experience would not only acquaint the participant with the sales tool but also with the preparation and conduct necessary to sell a particular type of customer. Such an effort, of course, must be undertaken by the company which is to be simulated by the game.

A. Another approach is to use the game to teach the use of specific management science techniques such as linear programming or linear decision rules with quadratic cost criteria.

More importantly however, the general management game appears to be a valuable tool in conveying to the participant the complexity, uncertainty and interrelatedness of the real world. Of course the more complex games have a greater opportunity to convey this message, but require longer periods to make each move.

Another important aspect of the management game, especially as the complexity increases, is the social interaction required to arrive at the necessary decisions in a limited period of time. When this is properly used, that is, when adequate counseling and subsequent opportunities to implement the advice are provided, it can be a valuable tool in teaching individuals to work as a team. More mundanely, it can give the participant a feel for what might be termed "the politics of the situation."

Of these three aspects, the use of games as a specialized training device will probably have the greatest short-run value in an organization. However, in spite of typical attitudes of many top executives, the second aspect, grasping the complexity, uncertainty and interrelatedness of a business, has great value if approached in the proper frame of mind. What is the proper frame of mind? The executive must keep in mind that he will learn things of a very general nature requiring some *post mortem* contemplation, and perhaps counselling, to get maximum benefit.

B. If he plays a generalized game hoping to learn something about his particular business, he will be disappointed. If he looks upon the game as an opportunity to test or to improve his skill in analyzing a particular environment and interpreting that analysis into a plan of action which he would subsequently carry out, then his experience will probably be quite rewarding. The executive having an overall responsibility for the operation of an enterprise, may find the experience worthwhile in terms of a review of certain aspects of business in his present position, with which he has had little experience.

If the executive assumes a role which is least familiar to him, he can broaden his understanding of such activities in the total enterprise.

Research

There is a great deal of research being conducted in universities regarding social interaction, decision processes and organization theory. The results of such research will soon begin to permeate industry. As it does, we should expect to discover more efficient ways of accomplishing certain organizational tasks. Work of this nature has been conducted by the Rand Corporation and at Carnegie Tech, especially by Simon and Newell. Predictions of things to come based on such work are most exciting.

Precommitment decision simulation

Many companies have developed mathematical simulators to predict the outcome of a given type of decision . By and large these have been micro in nature. An example of such a simulator is an investment simulator. By varying certain assumptions with regard to interest, growth of business, and economic factors, one can determine the out-

come without ever having committed any resources. This process is followed in most decisions that are made by executives, or any one else for that matter. The only difference is that by the use of mathematics it is possible to replace the qualitative judgments with quantitative measures. This sounds very simple and, of course, it is not. However, by quantifying those factors of a decision which are amenable to such treatment one can isolate the effect of certain variables and can discover the cost of particular qualitative factors in the decision. An example of such a cost is the run out cost in an inventory problem. An executive may not know what the run out cost is but he may be able to decide whether or not he is willing to incur a specific expense to prevent a run out.

Such an approach is inadequate in certain competitive situations. It is necessary then to tie together two or more single company simulators to produce a game, or competitive situation. When such a step is taken it will become possible for an executive to try a number of strategies, determine what possible reactions might be forthcoming from his competitors, and make commitments of resources on the basis of such pretested decisions.

The basic theory for such an approach is contained in game theory as developed by Von Neumann and Morgenstern, and others.

This is where, at least in my opinion, the greatest value exists to the busy executive. However, this step will probably be a few years away in most businesses although the techniques are used by the military now.

One of the ways in which we may develop such techniques is by beginning now to develop the less complex games, playing them, and providing feedback to those who developed the game. The feedback should be concerned with the degree of realism achieved and possible improvements in future versions. There is one considerable danger in developing such a game. If, for example, a very complex game is developed from scratch the complexity may obscure the inaccuracies of the model. Accordingly, there is a risk that inaccuracies in the results obtained from the game will not be recognized. Techniques of this type, it seems, are often considered to be accurate "because they are scientific." Obviously it is quite possible to be scientific yet be wrong.

Conclusion

Why, then, should the busy executive provide time for management games?

In the short-run there are rather specific benefits. Management games designed to fulfill a particular purpose can convey certain specific training in a dynamic situation. Only through such a technique can the trainee test his decisions, decisions based on *his* analysis of the environment, and be faced with the real world problem of living with the outcome in making future decisions.

The general management game can provide the executive with an opportunity to engage in decision making in areas not directly related to his specific task in his current real world assignment. He may benefit from the social interaction involved in the play. He can practice analyzing an environment and planning action in a dynamic situation where a mistake is not costly as it is in the real world.

In the long run, the executive will benefit from the research being conducted via the game technique. Most important, however, he will eventually be able to test certain decisions prior to committing resources.

Finally, the use of games requires a realistic approach by the participant. He must keep well in mind that the specific details of, and strategies used in, a general management game are not transferrable. It is the more general experience which will be of value. Furthermore, the results of the advanced models, those which may be used in reaching specific decisions, are not always right simply because they are "scientific." ■

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We Lost $25,000

But nobody had to pay

By Van B. Thompson

THE OFFICE was richly paneled in dark mahogany. Ceiling-to-floor drapery shielded the five occupants from the glare of the sun outside a glass wall along one side of the room. Suit jackets and papers covered the green leather chairs and divan. Coffee cups were empty, ash trays full. In the center of the softly-carpeted room was a plain table where five men sat morosely staring through the smoky air at five sets of operating reports. After six months, the special marketing division of the Ezee-Use Company had captured a large share of the market for its product; had built stocks for an anticipated rise in demand; had invested heavily in effective advertising and built up the most efficient sales force of all competing companies - but had just dropped to a new financial low of over $87,000 in the red. Costs had lately been cut to the bone, yet the high volume of sales was producing no profit.

Ezee-Use Company's predicament had developed during a day's running of Remington Rand Univac's sales management game, Marketing Management Simulation. As a participating member of the Ezee-Use team, I can testify that the decision making sessions we held were much more real than the word "simulation" implies. After only a few periods, many of the participants felt a strong sense of reality and of identification with their mythical companies.

The game sessions reported here were held May 26 and 27 in Detroit, and were sponsored by the American Marketing Association. On the evening of the twenty-sixth, all the participants met at McGregor Center, on the Wayne State University campus, for a briefing by Bruce DeSpelder and John Rath of Wayne State and Bill Sweeney of Remington Rand Univac. The Marketing Management Simulation is a competitive game in which teams, or companies, compete with one another, rather than against some optimum goal. The companies find their operations influenced both by what their competitors are doing and by a demand which is not static but changes in response to the overall effects of all the companies' actions.

Briefing

In the game, each team organizes itself into a marketing division to sell an unspecified product in three sales regions — eastern, western, and southern. The four major areas in which decisions must be made each month are sales personnel administration, product pricing, advertising, and stock management. In each of these areas there are a number of factors which must be considered in arriving at a set of decisions.

In sales personnel administration, for instance, the only motivation the company can give its salesmen is wages. Since the sales force is on straight commission, this involves setting a commission rate (which can be reviewed each quarter and need not be the same in each region) and keeping sales potential high through effective advertising, good stock supply service, and as near an optimum price as can be set. Salesmen may be hired, fired, transferred, or sent for one or more month's training; but these actions must be balanced against costs ranging from $500 for an unsuccessful attempt to hire an experienced man from a competitor or a successful attempt to hire a man off the street, to $1,500 for a month's training for one man. Each month a free market research report is available which includes competitors' commission rates. For $750 the company may purchase a personnel intelligence report which gives data on the total sales force of each competitor by region, plus the number in active selling and their sales efficiency rating. These are the raw data which, combined with a monthly operating and profit and loss report, form the basis for sales personnel decisions. The factors entering into decision making in the other operational areas are equally complex and varied; and decisions made in one area, of course, influence results in all areas.

After an hour's briefing on these and other points, all of which are also covered in an instruction booklet, the five competing companies met for the first time. Our group organized along functional lines, with a personnel manager, product pricing manager, advertising manager, and stock manager, each responsible for his operation in all three regions. As secretary, my job was to keep minutes, record decisions, and participate in all four areas when there was time to do so, which was seldom at the pace with which the simulation progressed. We then made our decisions for the first month, based on objectives and strategy we developed after organizing.

Actual gaming

The next morning we met at the Detroit Univac office for an all day session. The average decision cycle was about thirty minutes. After receiving re-

ports of the previous month's operations, ten to fifteen minutes were available to review results, plot the company's movement on graphs, discuss problem areas, and make and record a set of decisions for the next month. The decision sheets were picked up by a runner, key punched, and fed into a Univac Solid State 80 computer. The 80 processed the decisions of all the teams against an 11,000 instruction program, and printed resulting operating reports for the five companies in about six minutes. The time from submitting decision sheets to receiving the results was usually fifteen minutes.

Our price proved to be Ezee's trouble area. At the time we were in the most serious difficulty, our product was selling at 6 to 12 percent below our competitors'. Our initial strategy was built around a low price; but after cutting our expenses we still could not make a profit, so we were forced to raise price. When we did so, we chalked up some really excellent profit periods.

Worthwhile

All of the Ezee team members, when contacted a week after the game, were enthusiastic about the value of the simulation exercise. All wished the game had continued at least a period or two longer (to get poor Ezee out of the red), and two of the team members said they would like to play the game again, with the same teams, and believed they had learned enough so that Ezee would annihilate the competition. All said, too, that participating had given them more insight into the operational problems of managers of other areas in their companies, and a greater appreciation of the interrelationships that exist among the various marketing functions.

Our product pricing manager, while enthusiastic about the exercise, did feel that the use of a highly inelastic demand curve was not realistic for the beginning price with which we had to work. Our advertising manager wished our team had been larger, so that at least one person could have been given a top management position and devoted full time to review and criticism of operating management's decisions. Our stock manager wished we had organized regionally, so that a regional manager could make decisions in all areas for his region, and experimentation on a regional basis would be more feasible. These post-game comments seem proof of a deep involvement and definite carry-over of the simulation experience into the participants' working environments.

Oh, yes: another advantage of the exercise was that although at the end of play we had lost $25,000, nobody had to pay! ■

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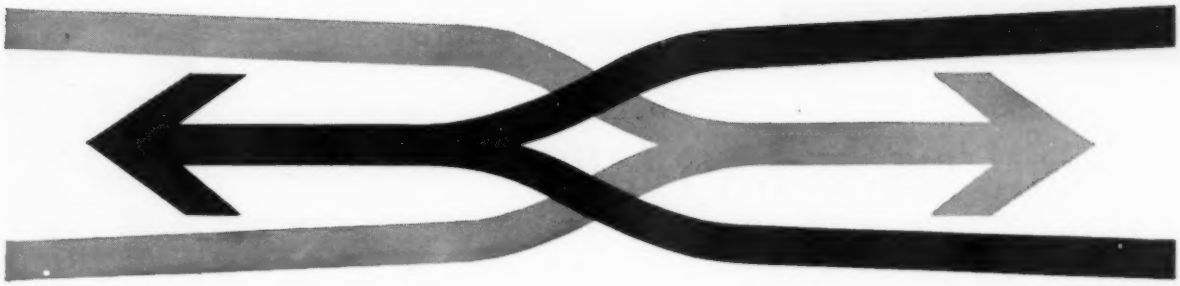

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Marien on FORMS —A Monthly Feature

Look At Your Letterhead . . .

RAY MARIEN

EVERYONE ELSE DOES! If it happens to be a particularly poor one, what kind of an impression do you think it makes on other companies? No matter how clever a man is, if he walks into your office looking for a job, wearing a shabby suit and run-down shoes, you're liable to terminate the interview almost before it starts. The first impression you get is often of very great importance. So it goes with letterheads. They are often your "salesmen," or your "job-seekers." If they don't shine, it may not matter how capable your company is, the business may go elsewhere.

Letterheads, no matter how fancy, represent such a small portion of your expense, that it is very foolish to stint on them and settle for inferior quality both in printing and design. Fortunately, the Madison Avenue grey flannel cavaliers have made at least one worthwhile contribution to industry in recent years that is disputed by practically no one. They have made people and companies *corporate image* conscious. In the course of this type of campaign, the importance of a company's letterheads has always been emphasized. They can furnish reasons, backed by motivation research, as to *why* people feel the way they do about certain goods and services. For instance, they can tell you that *type* suggests many things to different people. Heavy, bold type denotes strength and solidity. It belongs on the letterheads of big industrial firms, dealing in machinery or heavy equipment. On the other hand, light, delicate type faces are perfect for the company merchandising perfumes, toiletries, or feminine apparel. Much publicity along these lines in recent years has made American industry realize that many of their letterheads were "wrong" and gave people a misleading impression of them. Not only letterheads, but company *names* have been changed for just such reasons. That's how important this concept of corporate image has become.

Distinctions

So examine the designs on your company stationery with a critical eye — or better yet, have an outside firm do it, one that specializes in achieving effects that represent your company more accurately.

As for the printing and paper stocks, they are often dependent upon your choice of design. The one process that is used most often for reproducing letterheads is offset lithography. If it has a weakness, it is in printing heavy solids with *depth* of color. However, it can give you beautiful effects where vignettes, or fine type faces are utilized in your design.

Some firms believe in engraved stationery for their general external correspondence. I feel that this richness of quality is better suited for executive stationery, where it sets it apart and *above* the regular letterhead. The same can be said of the stock. One hundred percent rag paper, of extra quality, really belongs on your top brass letterheads, but 25 percent rag should be perfectly satisfactory for all other use.

Luxury

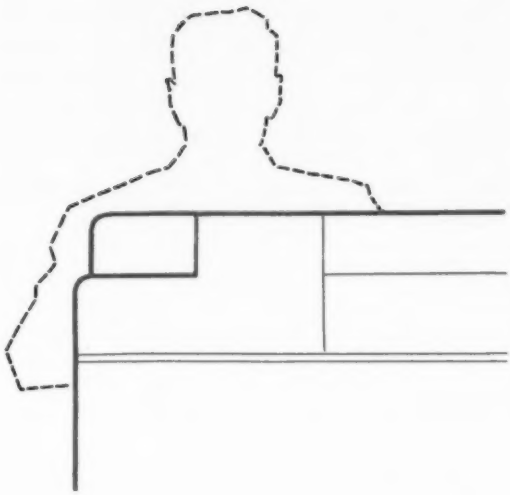
As for weight, 20 lb. is just right for the regular company letterhead, but 24 lb. gives added feel to the executive one. The same goes for color. There are dozens of shades of white, ranging from grey-whites through yellow-whites to blue-whites. The new fluorescent "whiter" whites are prevalent today in letterhead manufacture, yet to maintain that quiet air of richness, the grey-white, or yellow-white is suggested for your executive letterheads. There is no reason why all the extras shouldn't be built into the letterheads used by the top men in your company because there won't be many of them used annually, and those that are used will achieve the desired effect without overburdening your printing budget.

Die-stamping and blind embossing should be limited to letterheads used by small firms whose business is predicated on being artistic or creative. They would include art studios, advertising agencies, public relations firms, architects, industrial designers and the like.

Single-color letterheads, especially the all-black ones, are ultra-conservative, and should be used by banks, brokerage houses and financial institutions where the impressions of solidity and conservatism are of prime importance. Otherwise, a multi-color letterhead is suggested. Even if you use only two colors some nice effects can be achieved without labeling your company as a Hollywood-type operation. For example — a simple bar of a different color for each division in your company can be applied to their letterheads. This would serve as color identification, and would *add* to their appearance without being gaudy. Color attracts — make no mistake about it — but the problem is to use the right color, in the proper proportion, in the correct place. That requires the advice of an expert. ■

"BETTER CHECK THAT COMPUTER, HASSE, WE'RE RUNNING LOADED DICE!"

By Burt Nanus



The Computer Manufacturer's Role in Management Games

THE MANUFACTURER of electronic computers has many obligations to the users of his equipment. Not the least of these is the implied promise that he will assist the user to gain the maximum use and benefits from his hardware. The manufacturer now has the opportunity to be of service to a new group in the customer's organization, the Management Development Department, which is interested in using computerized games for purposes of management training. This service is being offered, with varying degrees of effectiveness, by most leading suppliers today.

Computerized management games

Management games have attracted a great deal of attention among management educators for a number of reasons — the involvement they create, the lessons about management principles they can help teach, and so forth. Because games are built to be only part of a larger course and to meet specific training objectives, many of them can be quite simple and need no computer. However, most of the more complex games which are being used today are programmed for computers for several good reasons:

Speed of computation — In most management development courses, particularly for the higher levels,. time is an important consideration. The computer can easily perform in a few minutes calculations that would take clerks a half hour or more per period with a desk-calculator, even with the most ingenious tables, charts, nomographs or other forms of assistance. Furthermore, the computer does *all* the calculations, leaving the executive free for analysis and decision making, while manual games often require that the participant share the computational burden — a very inefficient use of a manager's time.

Accuracy — An error in calculation during a management game play is at best distracting to the participants and at worst detrimental to the entire program. Many training directors will not use a manual game in a management course for this reason. The computer, of course, is extremely reliable.

Verisimilitude — In order to create the intense personal involvement typical of a game play, the simulated environment must appear real to the participant. The computer can assist in two ways: 1) by permitting the model to contain more of the decision elements in the situation being simulated, and 2) by providing legible, printed reports in formats familiar to the participant from his daily operations.

To be sure, there are disadvantages to the use of computers for management games, mainly in the areas of cost and scheduling; however, as will be discussed below, some manufacturers have made considerable progress toward minimizing these problems for the user. Although the main reason for suppliers to do work in management games is an obvious desire to contribute to the development of any new use of electronic data processing systems, there are other reasons why this is a particularly attractive field for them to explore.

In the first place, management games have made a tremendous impact upon training directors and business school professors in the four years since they were first introduced. Over 100 games are in existence, of which at least 35 are programmed for electronic computers.* Their acceptance by leading professional organizations, business schools, and corporations has been widespread.

(continued on next page)

*See *Management Games* by Joel M. Kibbee, Clifford J. Craft and Burt Nanus. New York City, Reinhold Publishing Company. 1961. 343 pages.

Although much of the early novelty has worn off, there are many new and exciting uses to which games can be put and their development is still in the pioneering stage.

Secondly, quite aside from their use in teaching management principles, games have proved very useful as an introduction for top management to the abilities of electronic computers. During the game play, the executive often watches his decisions being punched into cards and fed into the machine; he is aware of a great number of calculations taking place in minutes; he sees reports being printed out at 600 lines per minute with great accuracy. It quickly becomes obvious that the data processing chores that the computer is performing in the game — the profit and loss statements, the trial balances, the inventory records, the calculation of pertinent ratios and unit cost analyses to assist decision making — all these can also be prepared for the executive in his real life operations by the computer.

Finally, management games can provide a useful introduction to the role of computers in simulation, linear programming, and other sophisticated management problem solving techniques usually grouped under the term "operations research." An executive participating in a manufacturing management game, for example, soon realizes that a realistic mathematical model of production operations *can* be built. Even if he is still unconvinced, his very skepticism and his challenging the assumptions of the model provide healthy and useful insights. Since computers in the next decade will bring greater payoffs on the basis of their analytical and decision-assisting abilities rather than on their ability to do massive clerical operations, it is important for manufacturers to teach management how computers can be useful in this task. A management game is an excellent tool for this purpose.

Meeting the obligation

There are four services which the computer manufacturer can offer in the area of management games: 1) he can build games and provide instructions on how to use them; 2) he can assist the user to build his own specialized games; 3) he can provide computing facilities for management groups who would like to use games; and, 4) he can conduct research on new uses for the technique. Let us examine each of these in turn.

Building games — Several manufacturers have built games for their equipment and provided them to the user. Remington Rand Univac has at least one game for most of its computers now installed and maintains a special staff for its games activity. Marketing Management Simulation, for example, is programmed for the UNIVAC® I and II computers and the Solid State 80 computers in both card and tape versions. The company provides the necessary program tapes or decks, operating instructions on how to use them, briefing outlines and other necessary forms for the participants, and even a briefing outline keyed to slides for the administrator — all as an extra free service to the customer. If a game is well documented and packaged, it is not difficult for the user to adapt it to his particular needs.

Assisting the user — Often the user will wish to build a game specifically tailored to his company's problems. In fact, most of the computer games now in existence *were* built by users rather than manufacturers. The latter, however, can offer considerable advice and assistance, particularly in the computer aspects of game design. Remington Rand is currently building a library of special subroutines that are useful for many different types of games.

Running games — Organizations that do not have the particular computer for which a desired game is programmed can still avail themselves of this technique by renting the necessary computer time at a nearby service center. If it is not possible to move the participants to the computing facilities, the game can still conveniently be run on a discontinuous basis (that is, one set of decisions per week or every few days) by mail or telephone. This has proven a popular mode of play for business schools and long training courses. Remington Rand's games have been used by dozens of the leading business schools (including Harvard, Wharton and Columbia), professional organizations (including S.A.M., A.M.A., N.M.A.A., and A.I.I.E.) and corporations, sometimes continuously and sometimes over a period of weeks or months.

Research — Many computer manufacturers are attempting to develop new games and new uses for the technique. For example, the author is currently supervising the development of a civil defense game that will be used for training civil defense directors across the country. Other games in specific functional areas of management and for specific industries are under development. Some researchers are exploring the use of games for economic and organizational research and for personnel testing and selection. The potential uses of this technique are just now beginning to be realized.

In the future, many new games will be built and the computer will be used more and more for this type of activity. The computer manufacturer must be aware of his obligations in developing new uses for his equipment but, by the same token, the ultimate responsibility for the success of a new technique rests with the user. It is only through mutual cooperation in the management games area as elsewhere that the fullest benefits of new computer uses will be realized. ■

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DeParis on EQUIPMENT —A Monthly Feature

JOSEPH R. DE PARIS

Aids for IBM 1400 Series

THE IBM 1400 COMPUTER SERIES continues to be improved by the addition of optional features and programming aids which increase the throughput potential and facilitate the writing of program instructions.

Three aids — COBOL, Autocoder, and an Input/Output Control system — are recently announced additions to the array of programming routines available to 1401 users. COBOL (*C*ommon *B*usiness *O*riented *L*anguage) has been developed as a cooperative effort of several computer manufacturers and users. Being problem-oriented rather than machine-oriented, COBOL is a free form system using the language and verbs of normal English rather than specific computer codes. A program written in COBOL does not require detailed knowledge of machine codes. To be used in a computer, such a program must be converted into an object program containing the specific codes and language of the computer being used. This is accomplished automatically on the computer with the use of a COBOL processor program made available as part of the package.

COBOL has the advantage of relieving the programmer from use of specific machine codes; it is written in a language recognizable to management, programmer, and computer. It is readily adaptable to develop object programs for computers of different series and manufacture. Often COBOL may result in getting "on the air" faster. The disadvantage of COBOL lies in the fact that it is general rather than specific with regard to a particular computer. Special features may not be brought into play in the most advantageous manner or may be bypassed entirely. This sometimes will result in a less efficient object program which consumes more processing time than a machine-oriented source program would have taken.

Another aid, simultaneously announced, is the 1401 Autocoder system, a symbolic programming system which simplifies the preparation of 1401 programs. This is a machine-oriented system which includes macro-instructions. A single macro-instruction will generate a sequence of machine-coded instructions. Autocoder is more advanced than, and an improvement over, SPS-1 and 2, the earlier automatic programming systems for the 1401. Programs written in 1401 Autocoder will run on the larger 1410 system as well.

IOCS

The third aid is the 1401 *I*nput/-*O*utput *C*ontrol *S*ystem. This system provides a set of instructions and routines that efficiently perform input/output operations. Using only four IOCS macro-instructions, the programmer can instruct the computer's input/output hardware.

The value of this programming system is brought sharply into focus when it is realized that in a typical computer program approximately 40 per cent of the instructions are devoted to input/output operations.

Several optional hardware features which enhance the computers' ability to process data faster have been made available. These include a Numerical Print feature for the 1403 printer, a dual-purpose printer — the 1404, and an early card read feature for the 1402 card read punch.

Hardware aids

The Numerical Print feature involves a numerical chain cartridge which can be interchanged with the normal chain by the operator with no special tools. The numerical chain is composed of 15 character sets, with 16 characters ($. , * — □ and digits 0-9) in each set. The 1403 in its numerical mode can print 1,285 lines per minute, a significant boost in speed for high volume printing of numerical data.

The 1404 printer introduces a new ability to the 1401 system. The 1404 has, in addition to all of the features of the 1403, a new card document station. With this station the 1404 can be set up by the operator in either a card printing mode or a form printing mode. This is accomplished by physically positioning the movable chain-printing mechanism at the card station or the continuous forms station.

The card document station will accommodate 51 column cards up through a double card width document. Documents of 80 column width or less can be printed two at a time with the same or different data and format. A company feature is available which makes it possible to read pre-punched data into core storage from a card being printed. This offers complete assurance that data is being printed on the proper pre-punched card.

Early card read

The most recently announced feature, the early card read for the 1402, will be important to any user who enters significant volumes of cards into the system. This new feature provides a three toothed clutch for the 1402 rather than the existing single tooth clutch. This clutch reduces the time between points where 1402 card reading can be initiated when card processing time exceeds ten milliseconds.

In the standard 1402 with only one engage point during the 75 millisecond read cycle, a card read cycle is skipped whenever processing exceeds 10 milliseconds. In operations of this nature, the interval between card reading becomes 150 milliseconds and the card input rate drops from 800 to 400 cards per minute.

A 1402 equipped with an early card read clutch provides three points in each cycle at which a card can be fed. This cuts the interval between points from 75 to 25 milli-

(continued on page 46)

APPLICATION OF THE MONTH

Source Data Saga — 20,000 strapped employer tax returns are converted into a few reels of microfilm by Social Security Administration, Baltimore. Digital data for 250,000 employees are transferred to 120,000 punched cards. These in turn are converted to magnetic tape. When the inputs are completed, the original paper and cards are sold as scrap; the magnetic tapes are erased but reused through orderly rotation. The sole remaining input record is the microfilm.

Social Security Jettisons Paperwork

Microfilm and magnetic tape utilized for data processing and storage.

Updating Microfilm Programs — Social Security Administration makes between 200,000 and 250,000 splices monthly to update its microfilm programs. It splices the film of new quarterly earnings payments to its original microfilm ledger of Social Security accounts. In addition, it interfiles additions and changes electronically in its national employee index of card holders. This is printed out as microfilm and spliced to its original microfilm record.

WITH A WORK FORCE OF 5,600 — or one person for more than every 24,000 accounts — The Division of Accounting Operations for the Bureau of Old Age, Survivors and Disability Insurance of the Social Security Administration has evolved new management concepts in records administration.

Paperwork disappears in the office. In its place are microfilm and magnetic tape to furnish both the digital computations and facsimile support for 136 million Social Security accounts.

One new management concept is the destruction of data as soon as it has been converted into an automated format. Yearly, Social Security gets some 30 million pieces of paper for employer tax returns. These never go into files. They are destroyed as soon as they have been microfilmed and their detailed entries recorded on approximately 280 million punched cards.

These punched cards do not go into the files either. They are destroyed as soon as their digital information has been transferred on to magnetic tapes, of which there are 30,000 rolls at Social Security.

The information on these input tapes is transferred onto a master output tape and onto other output tapes that, in turn, are later printed out as microfilm. After conversion, the input tapes

Microfilm Files — Social Security has evolved a new concept in the use of microfilm. It keeps one set of film at work stations for individual operators who handle specific requests. A second set is filed in these banks for detailed examination of a file. This arrangement eliminates backtracking in the work flow.

are erased and then reused in a scheduled sequence for later input operations.

Consequently, all the source data for Social Security is converted into rolls of microfilm and updated magnetic tape. By converting employer tax returns into microfilm, Social Security Administration has but 250,000 reels of film in 30,000 square feet of space instead of 700 million pieces of paper in 44,000 file cabinets and 200,000 square feet of space.

Microfilm programs — updated

The second new concept in records administration at Social Security is to update microfilm electronically from computer output. Social Security has three major microfilm programs: employer tax returns, individual earnings record and a national employee index of card holders. The microfilm files for individual earnings records and the national employee index are updated electronically.

The basic output of the computer at Social Security is magnetic tape. One of the magnetic tape outputs is converted directly from tape to microfilm by a cathode ray camera that records 16,000 characters a second. This microfilm provides both the updated facsimile proof of individual earnings records for 136 million accounts and updated alphabetical files of all card holders.

To update information on roll microfilm, Social Security makes between 200,000 to 250,000 film splices monthly. A small number of splices is made for retakes. The largest number of splices is made to update individual earnings records and to interfile additions to the national employee index.

A third management concept is the agency's preference to work from a microfilm file rather than from original paperwork. Three of its five major files are on film. The two not on film are the file of original applications for Social Security and correspondence with Social Security accounts.

Workload shows usage

The extent of its microfilm usage can be seen from its workload. The Division of Accounting

Magnetic Tape Library — Social Security houses its magnetic tape library in a room adjacent to its computer operations.

Operations makes some 2,000 facsimiles daily on 3M Filmac 100 Reader-Printers from its file of employer tax returns. Furthermore, some 25,000 lookups are made daily from the microfilm file of individual wage earnings records. Even though it has an alphabetical file of 176 million names on microfilm, the division can locate any name and Social Security number in an average of 30 seconds. The division refers to this name file from 20,000 to 40,000 times daily.

The division does all these jobs while adding 3¼ million new accounts yearly and making three million changes yearly in record data. In addition to these operations, it receives approximately 15,000 applications daily for Social Security benefits. Many of these applications require reference to both the employer tax returns and to the individual earnings records.

To operate its microfilm files for this workload, Social Security has broken up the files by segments. Employer tax returns are broken down by a master block, within master block by 25 units, and within units by 200 pages of returns. Two rolls of microfilm hold 5,000 pages, or one master block.

Individual earnings records are broken down by 1,000 Social Security account numbers for each roll of film. Each breakdown of 1,000 accounts, even with quarterly increments of new payments, is not expected to exceed 100 feet of film.

Splicing new data

Splicing updates this file. Originally, the individual earning records were maintained on machine-posted ledger sheets. These sheets were microfilmed in blocks of 1,000 account numbers to form the base of the microfilm file. The later earnings records were tabulated from punched cards, when the computer was installed, and this information was converted into magnetic tape and printed out as film.

The film printout was spliced to the master roll. Additional quarterly statements also are spliced. Each statement shows the previous balance credited to the account and the addition for the quarter. In many instances, a reference to the ledger sheets or to the latest balance and earnings data answers inquiries for Social Security.

The Soundex code is used for the national employee index file. It is broken down by name codes, and annually about seven million additions are made to the existing name file. As in the employer tax return files, Social Security, with its updated microfilm, will have information in more than one place on the roll but never on more than one roll.

Plans now for tomorrow

The national employee index file demonstrates the fourth management concept in Social Security for records administration. This concept is to program now for benefits tomorrow.

Originally, the national employee index with its 176 million names and its 20,000 to 40,000 references daily was on flexoline strips. These strips were converted to microfilm. But before the microfilm was made, Edward Rosse, managment analysis officer for the Division of Accounting Opera-

(continued on page 28)

Microfilm Filing — Wire baskets hold microfilm files of employer tax returns at Social Security. Instead of removing papers from a file, Social Security prints out copies from 3M Filmac 100 Reader-Printers. Work is brought to the individual stations. If paperwork had been retained, Social Security would have 700 million pieces of paper in 44,000 file cabinets using 200,000 square feet of space. Instead, it has 250,000 reels of film in 30,000 square feet of space.

A WALNUT for Information Retrieval

IN what may be the most ambitious assault yet made against the mounting information retrieval dilemma, IBM has completed the development of a new retrieval system which eliminates sequential machine searching for desired information. IBM's WALNUT system, being put together for the Central Intelligence Agency, holds 99 million doubly-reduced film document images in an electromechanical file unit. The documents are addressable in random sequence, and the system may be increased in capacity to in excess of 100 million document pages by adding more file units. The index to these documents, also accessible in random order, is maintained in a magnetic disk file. The third component of WALNUT is a document input converter.

Input

When a new document is received, it is assigned a document number and the number of pages is recorded. This information is key punched into a document control card, to which other data will be added later. The usual index record data (title, author, etc.) plus an abstract, are punched into paper tape, from which this information is loaded into disk storage.

The disk file is organized alphabetically by subject heading, or keyword. The incoming document must, of course, be classified before entry into the WALNUT system, and the subject headings assigned are part of the paper tape index record, making it possible to store like items in the various subject areas of the disks. This is the type of file organization which makes the disk/index searchable in a random manner: the subject looked for determines the disk area to be searched.

Meanwhile, the document itself is given its first size reduction by using a standard 35mm. microfilm camera. Now, the 35mm. image of the document, and the document control card, are both placed in a special purpose machine called the image converter. This machine does three things:

1. Using a new Kalfax heat-developed photo material produced by the Kalvar Corporation, the microfilm image is further reduced, to less than one-thousandth the size of the original document; placed on a strip which holds 99 such images; and inserted into a plastic cell which holds 50 such strips. When filled, these cells are manually removed and placed in the document file, which holds 200 cells — or 99 million images.
2. The file address (cell, strip, and position) is generated.
3. This information is punched by the converter into the document control card.

The last input step is to let the index (in disk storage and not connected to either the converter or the document file) know where the converter has placed the document in the document file. Since the converter punched this information into the document control card, all that is required is to read the data into the disk unit from the card.

Retrieval

To search for needed information, the user specifies his subject headings; these are matched by a processing unit against the disk/index. Both a listing and a set of item cards

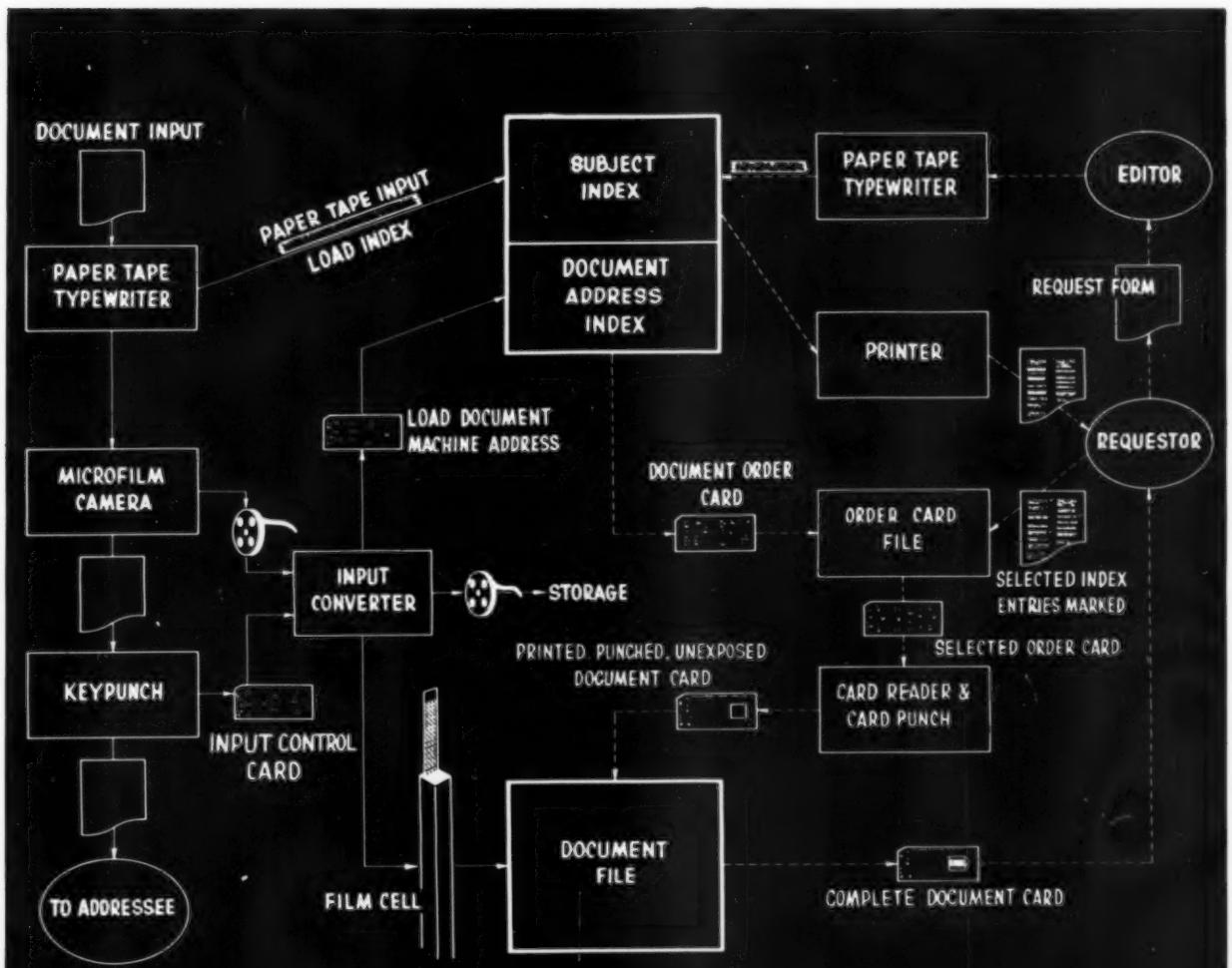
are produced. The user checks usable items on the listing, and the matching cards are pulled and reproduced (with all necessary identification codes) into aperture cards carrying unexposed film.

These aperture cards are then run through the document file. As each card is read, the corresponding document image is selected and projected onto it. These cards are ejected from the machine bearing an exposure of the selected document, and may be used like any other microfilm-bearing card: projected on a viewer, reproduced on full size hard copy, etc. The image maintained in the document file is never removed in this process, although the cells of 50 strips are manually interchangeable. The disk/index can be searched for a specific document in one to two seconds. A maximum of five seconds is required to photographically extract any item in the document file.

Processor

IBM does not specify the processor to be used in the CIA system, but probably a computer would be needed which has punched paper tape and punched card input, and punched card and line printer output. Matching of request data to the disk file is done in registers through normal programming techniques. Although WALNUT is not presently being offered for sale, it is interesting to speculate on the price of such a system equipped with, say, a 1401 processor. At any rate, IBM seems to have put some production units and some new special purpose devices together into a major improvement in information retrieval systems. ■

Document File, IBM WALNUT system



System Diagram: WALNUT Large-Capacity Document Storage and Retrieval System

(continued from page 25)

tions, checked with manufacturers of optical scanning equipment to make sure that whenever optical scanning becomes available to read from paper, it also will be able to work with his microfilm.

To keep this file up-to-date, additions since the conversion of the flexoline strips are kept on magnetic tape. New names to index are electronically interfiled with names entered since the date of microfilm conversion. Thus, the roll film with splicing consists of two segments: the original flexoline names plus the electronically interfiled additions that are periodically converted from magnetic tape to film.

Filmwork vs. paperwork

Many of the innovations in Social Security records procedures have been initiated by Mr. Rosse. Here are his views on paperwork files:

"The wrong microfilm program is to film a lot of papers with the idea that they will never be looked at, so it makes no difference how they are filmed. The right way to use microfilm is to film with retrieval in mind and to use filmwork to eliminate the problems of paperwork.

"For example, pulling records from the files means loss of records, misfiles and damage to the records. Our microfilm is a reference copy backed up by a master copy that can always replace the reference copy.

"We have several programs using the same microfilm record. We put one set of film in operator stations to handle specific requests to these records. This film never leaves the operator's control. Then we have another set of microfilm that anyone can use. We always have a copy of the record available. One set of film is used for inquiries. The other set is used for detailed examinations of a file.

"Contrast our ability to maintain an intact file of microfilm for multi-purpose reference as against the use of original paper. Our basic input to the microfilm files is 30 million pieces of employer tax returns. We have no control over this input. In the course of a year, we will get one file cabinet of paper out of 30 million pieces that are impossible to film. So far, we have five such cabinets and we think it is too much.

"Why is this paper unfilmable? Some offices use pencil for their returns and they use extremely hard pencils with too light a touch. Other offices allow typewriter ribbons to be used forever. Still others exercise little control over the condition of their addressing ribbons and plates. Others have typewriters whose alignment is so poor that these machines emboss instead of print.

"The quality of paper used for tax returns is such that much of it cannot last long enough for permanent records. Microfilm upgrades much of our paper input and keeps us from making records errors in a large filing program. Our files in original paperwork could not withstand our rate of reference and usage."

Two files kept on paper

Two Social Security files are retained in original paper format. One file, called the SS-5, comprises the original application for Social Security. Changes in name have to be posted to these applications. The second file is the correspondence file.

This correspondence file is another example of present planning for future action. It consists of 2½ million folders or less than 2 percent of the total number of 136 million accounts. Many folders contain but one or two pieces of paper.

To retard the rate of file growth in correspondence files, Social Security correspondents, when answering any mail, determine: whether the correspondence shall be filed and, if filed, how long it will be kept. Retention schedules are one year, four years and permanent.

The correspondence files are continuously screened, which keeps the rate of file growth remarkably low for the size of this operation.

"The well-run office," Mr. Rosse said, "must be a factory today. In our case, our job is to provide certification so that payment can be made for old age, survivors and disability insurance. Every job done in our factory must contribute to an expeditious certification and the biggest payment possible under the law.

"With our workload, we cannot afford to do any unnecessary job. The only information that we originate, store, retain and manipulate is information that we need to certify and determine the amount of payment."

Microfilm is made to be used

One of the questions most frequently asked of Mr. Rosse is whether his microfilm procedures are adaptable to smaller operations. Here is his answer:

"We bought the first cameras to film two sides of a document simultaneously. We also bought the first microfilm camera attached to a computer to transform magnetic tape via cathode ray to microfilm printout. After it was developed, we installed it. Such units are now available commercially. Our reader techniques, our methods for lookups and our splicing procedures are now commonplace in other agencies of the government and in industry.

"Our problems are not unique. Nor are we the only ones to need new products that result in better management controls. Anyone can use microfilm, the moment he makes up his mind that microfilm is made to be used." ■

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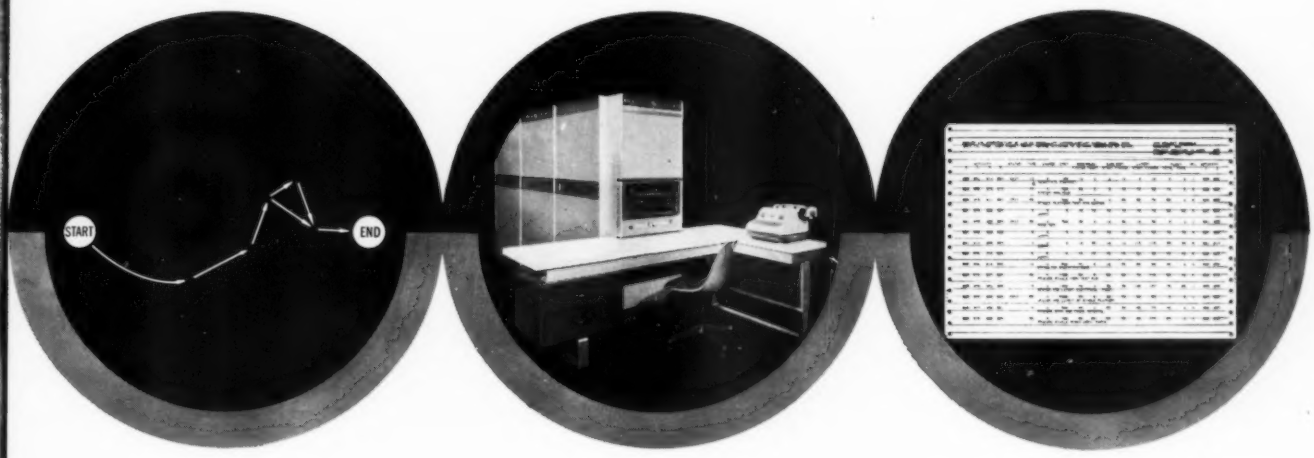

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Use the Editors You Have!

Key punchers catch source errors better than clerk editors

WHILE you are daydreaming about the time when scanning devices will solve all your input problems and do away with your key punch department, you might ask yourself this very pertinent question: Are we making the very best use of our key punch operators? Can we, for example, turn over to them a large share of the editing of the input documents?

We are convinced that with intelligent form design and proper training of operators the editing of input documents can be done in the key punch section, eliminating perhaps completely the clerical checking and preparation of these documents.

The Commission on Professional and Hospital Activities conducts, among other programs, the Professional Activity Study (the PAS). The Commission is a nonprofit medical research organization whose goal is to help in the improvement of patient care by providing physicians with a great deal of accessible medical information about their current practices.

The operation of the Professional Activity Study is basically simple. A hospital elects to join the PAS and thereafter its medical record department prepares an abstract of the medical record of every patient after his discharge. These case abstracts are sent to the Commission where they are transferred to punched cards and processed in several different ways. The hospital receives certain essential monthly reports which it must maintain to keep its accreditation and at the same time its medical staff is regularly given what amounts to a survey of its medical and surgical practices for educational purposes. In the meantime a pool of clinical data accumulates within the structure of PAS, providing a unique source of information about hospitalized patients for use in research of many kinds. We are concerned in this article with the Commission's system for editing these case abstracts and turning them into punched cards.

When the PAS was in its pilot study seven years ago, these abstracts were received in the central office at an average rate of 30 to 40 per day. It was fairly simple for a clerk to examine each one of them for omissions, inconsistencies and illegible entries, returning the rejected abstracts to the hospitals for correction. In spite of the fact that our clerical editor was well trained, we discovered that our lone key punch operator still turned up occasional sheets which should have been rejected by the editor. This caused us to turn the editing function over to the key punch operator herself and eliminate the precheck by a clerk. We are glad we did. With abstracts now pouring in at the rate of more than 6,000 per day, imagine what a roomful of clerks we would need today!

William H. Kincaid and Charles H. Simpson

Exactly what kind of editing does our key punch operator do? In five major areas she is in our opinion the most efficient kind of editor:

Omissions of essential information. Nothing is simpler for the key punch operator to learn than that she can neither read nor punch something which isn't there.

Coding questions. The medical record librarians in the hospitals are carefully instructed in coding the great number of items contained in the PAS case abstract. When they have a question they merely write it somewhere on the face of the form. The key punch operator rejects any form which contains any notes other than the normal codes and checks. Again, simple.

Illegible entries. Occasionally even a highly skilled clerk will enter figures which would puzzle a cryptographer.

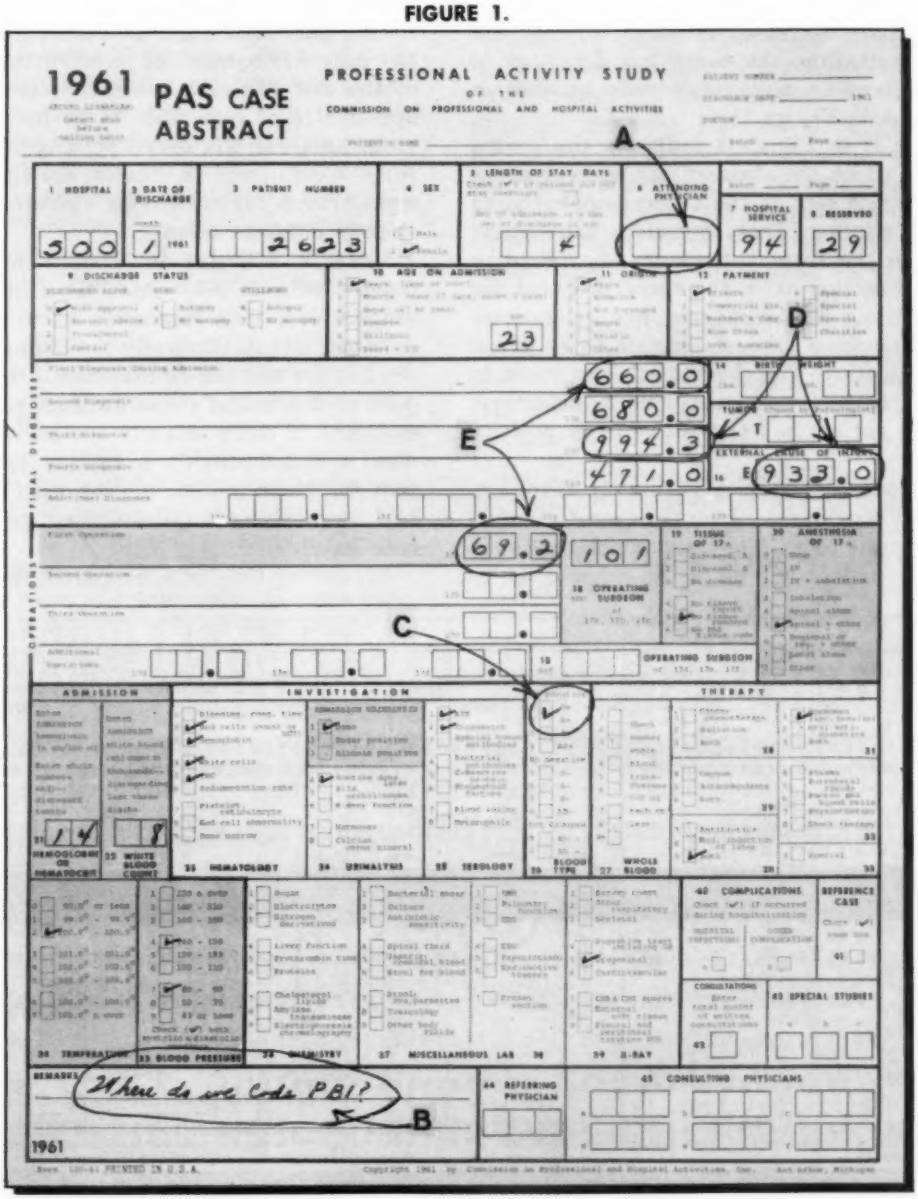
Rearrangement of codes to fit the punched card. To make best use of both the abstract and the punched card certain items of information may be rearranged by the key punch operator according to predetermined patterns. Not too difficult.

Internal inconsistencies. Since males don't have babies, for example, the key punch operator quickly learns to reject this kind of anomaly. In this area she becomes most valuable.

Form source

Figure 1 is an example of a 1961 PAS Case Abstract form on which is shown one each of the five kinds of input edits which the key punch

FIGURE 1.



operator can make. The form itself looks forbidding but actually it can be completed quite rapidly by personnel of the hospital medical record department. It contains an amazing selection of information concerning investigation, admission findings, therapy, and other pertinent information about the patient and his care during a hospitalization. We are able to get all of this information into one punched card but 14 columns must be multiple-punched (see Figure 2). In about seven percent of cases, however, a trailer card is used: those having more than four diagnoses and/or more than three surgical procedures.

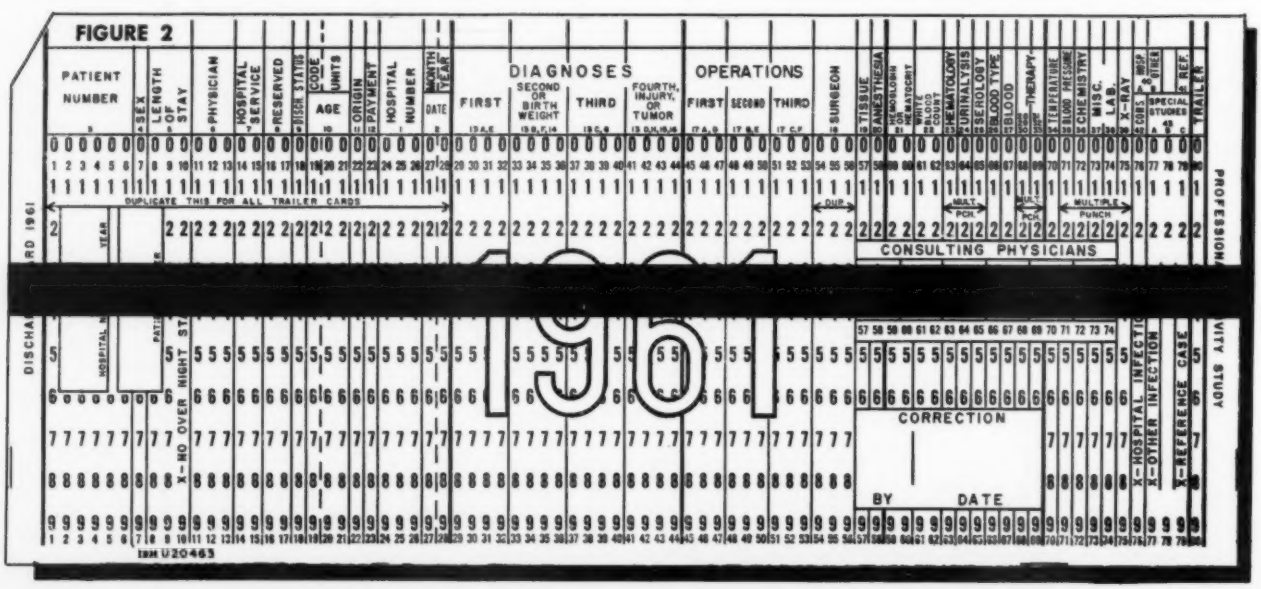
Depending to some extent upon the type of patient and the hospital involved, there are between 10 and 17 items which absolutely must be entered on every case abstract form. With certain minor exceptions every item in the first two lines of the form must have an entry of some sort. In the prepared illustration, the coder has forgotten to enter the attending physician's code number in Item 6 (see A in Figure 1).

The letter B in Figure 1 indicates the coding question for which the abstract will be rejected by the operator and sent to the Commission's coding experts for solution. These questions can appear any place on the form but are usually found in the remarks section or in the space provided for questions among the diagnoses and operations. Letter C indicates a kind of illegible entry which needs investigation. The check mark was made in such a way that it was impossible to determine whether the patient had O positive or A positive blood type.

In the punched card (see Figure 2) there are four fields of four digits which are used for entering the diagnosis codes. The code number assigned to an injury patient will be in the range 800.0 to 999.0 and the medical record department in the hospital is required to submit with this diagnosis code an external cause of injury code (Item 16 on the PAS Case Abstract). Whenever either one of these two kinds of codes appears without the other, the case abstract is rejected. Because no field is set aside on the card specifically and solely for the four-digit external cause of injury code, it is always punched in the fourth diagnosis field. Consequently, when there are four or more diagnoses the key punch operator must rearrange the diagnoses in order to place the external cause of injury in the fourth field. In the illustration (letter D), code E993.0 would be moved into the fourth diagnosis field with the E becoming a zone 12 punch, and code 471.0 would be moved into a trailer card as an overflow diagnosis. This may sound intricate but it is quickly learned and easily followed. In this particular case, of course, the punching of the code 471.0 must be delayed until the whole of the case abstract has been punched, then the operator must remember to go back to the diagnosis area for the overflow diagnosis. Items 14, Birth Weight, and 15, Tumor, are also "rearrangement" items for which the operator must follow slightly different rules.

Letter E indicates an internal inconsistency in codes. The code 660.0 indicates a normal delivery but the code 69.2 represents a circumcision of a newborn infant. Obviously the coding clerk's memory slipped and the circumcision code should have gone on the infant's case abstract rather than the mother's. If there was any operation at all on this case it was probably a routine episiotomy, the code for which is 76.3, and the coder just mixed up two commonly used codes without referring to her code book.

Of course, this is a prepared illustration and



we would probably never find all of these kinds of editing problems on any one case abstract. We have shown just one example of each of the five types of editing discrepancies; many other examples of each of these types occur frequently in the daily routine.

Rejections

The case abstracts rejected for reasons of omissions, coding questions and illegible entries are very easily taught to the new key punch operator. The rearranging of codes to fit the punched card is a little more difficult but easily mastered in a few days. The editing for the commonly found types of internal inconsistencies, however, requires considerable guidance. Within three months, an experienced key punch operator or a trainee can acquire a good knowledge of all the commonly found inconsistencies and discrepancies on the abstracts. Her learning never stops, however, as she becomes more and more familiar with the code structure and the tremendous variety of combinations of codes. Regularly she catches such coding errors as male deliveries, stillborn infants discharged alive, 25-year-old newborns, no tissue removed on appendectomies, spinal anesthesia given for tonsillectomies, transfusions given without reporting the blood type, and many others. Of course, the operator is not expected to catch *every* coding inconsistency but subsequent machine checks of the punched cards themselves turn up very few which are missed.

The key punch operator is obviously *better* than a clerical editor for such things as omissions and illegible entries. Moreover, we maintain that she will regularly find a higher percentage of the internal inconsistencies than the clerk. The operator reads the form and *acts* upon it, and as she becomes experienced she will develop neuromuscular reactions in permissible patterns. Deviations from these established patterns will almost automatically call her attention to a coding discrepancy and the time she must spend in decision making will gradually diminish as she becomes more highly skilled in the job.

Key punching

Something further should be said here about the training of the key punch and verifier operators. We stress accuracy above all and insist that the new girls, whether experienced or trainee, punch slowly and concentrate on accuracy both in punching and in editing. During this three-month period the supervisor works alongside the new operator, answers her questions and verifies her work, calling attention to both punching and editing errors. After approximately six months the good operator will be producing regularly an average of 160 to 200 abstract cards per hour for a 7½-hour day (the average number of strokes is about 70 per card). When the operator can maintain this speed with no more than two error cards per hundred she can qualify for verifying. In our system an error card is either a card containing a punch error or a card for which the sheet should have been rejected. When the girl becomes a verifier, her work is regularly spot checked from time to time by having the supervisor reverify occasional batches of abstracts which she has verified. The good verifier will verify an average of 200 to 320 abstracts per hour in a 7½-hour day. The verifying record established recently was 3,040 abstracts in one 9-hour day or an average of 338 per hour. This discussion of rates is meant to underline the fact that speed does not seem to be sacrificed for the high quality in editing.

During a typical eight-week period in the fall of 1960, the key punch section punched just over 250,000 abstracts and rejected 6,255 for some kind of editing problem. The over-all rejection rate was 2.5 percent. Daily rejection rates during this period ranged from a low of 1.2 percent to a high of 6.8 percent. Of course, the hospitals which have recently entered the program have considerably higher rates than those that have been in for several months. It is not unusual for us to reject 12 to 15 percent of the abstracts submitted during the first month or two of the hospital's participation. Under normal circumstances the rejections fall to about one percent for the hospital which has been in the program a year or more.

The Commission is certain that it has saved a great deal of money by not having to develop a preediting system to prepare its input documents for key punching and that the editing responsibility has been placed upon the operator without materially affecting her speed. Nevertheless, there are certain other important advantages in increasing responsibility in this area of the key punch operator's work. First of all, the operators take a very great interest in their work — work which is of a highly repetitious nature and which under ordinary circumstances could become very tiresome. They feel that they are continually learning more about their work, about medical affairs, about patient care in hospitals — all of which helps them grow and develop on their jobs. Although we have recently had some turnover due to pregnancies and relocations to other cities, at one time within the last eighteen months all of the seven operators in the department had been with us at least a year and a half. There are now thirteen operators and all are trained to punch PAS cards, which represent the bulk of our card production.

We are convinced that key punch editors do the

(continued on next page)

best job in helping us continually remind the hospital personnel of the importance of accuracy in completing the form. The medical record librarians strive to improve their rejection rate and are alternately proud and embarrassed as this rate fluctuates from month to month. On the whole, however, all hospitals show a gradual improvement over the months, an extremely important factor in maintaining the uniformity of reporting so that the information can be used with confidence in research studies of various types. Hospitals new to the system are always surprised and impressed with the wide variety of types of errors discovered by our key punch operators.

The punched card application discussed here is not typical of most business installations. Nevertheless, wherever input data is prepared by many different people and must be edited in some fashion for key punching, it seems that the key punch operator can be developed into a true editor, thus relieving clerical editors for other jobs. It is costly to make the mistake of underestimating the capabilities of the average key puncher and her desire to continue to learn and grow in her job. ■

Coming Events

AUG. 22 - 25
WESCON, Western Electronic Show and Convention. IRE/7th Region and Western Electronic Manufacturers Association.
Cow Palace, San Francisco, Calif.
Contact: E. W. Herold, c/o WESCON, No. California Office, 701 Welch Rd., Palo Alto, Calif.

AUG. 22 - 25
Career Center sponsored by Careers Inc.
Bayside Motel, 2011 Bayshore Blvd., San Francisco, Calif.

AUG. 23 - 26
The Institute of Management Sciences, 8th International Meeting.
Palais de Congres, Brussels, Belgium.
Contact: TIMS, Box 273, Pleasantville, N. Y.

AUG. 28 - 30
American Accounting Association Convention.
Austin, Texas.

SEPT. 5 - 8
Association for Computing Machinery, 16th National Conference and 1st International Data Processing Exhibition.
Statler Hilton Hotel, Los Angeles, Calif.
Contact: Ben F. Handy, Jr., General Chairman, Litton Systems, 5500 Canoga Ave., Woodland Hills, Calif.

SEPT. 6 - 8
IRE International Symposium on Transmission and Processing of Information.
Massachusetts Institute of Technology, Cambridge, Mass.
Contact: Peter Elias, MIT, Room 26-347, Cambridge 39, Mass.

SEPT. 11 - 15
Fall Instrumentation-Automation Conference, ISA 16th Annual Meeting and Exhibit.
The Biltmore Hotel and Memorial Sports Arena, Los Angeles, Calif.
Contact: Wm. H. Kushnick, Exec. Dir., ISA, 313 Sixth Ave., Pittsburgh 22, Pa.

SEPT. 11 - 15
SHARE Computer User's Conference, IBM 701, 704, 709 and 7090.
Washington, D. C.
Contact: Mr. S. S. Closman, IBM Data Processing Div., 112 E. Post Rd., White Plains, N. Y.

SEPT. 18 - 23
Electronic Representative Association, Business Management Institute.
University of Illinois Campus, Champaign, Ill.

SEPT. 19
Data Processing Magazine Roundtable, "DPs of EDP."
McGregor Memorial Conference Center, Detroit, Michigan

SEPT. 19
Tabulating Card Manufacturers Association General Meeting.
New York City, N. Y.
Contact: C. A. Greathouse, Exec. Sec., TCMA, 145 E. 32nd St., New York 16, N. Y.

SEPT. 20 - 21
IRE, PGIE, AIEE and ISA Industrial Electronics Symposium.
Bradford Hotel, Boston, Mass.
Contact: Ronald A. Jurgen, Sutton Publishing Co., 172 So. Broadway, White Plains, N. Y.

SEPT. 25 - 27
Life Office Management Association Annual Conference.
Shoreham Hotel, Washington, D. C.

SEPT. 28 - 29
American Production and Inventory Control Society 4th Annual National Conference and Exhibit.
Pick-Congress Hotel, Chicago, Ill.
Contact: APICS, 330 S. Wells St., Chicago 6, Ill.

OCT. 2 - 4
IRE 7th National Communications Symposium.
Utica, N. Y.
Contact: R. K. Walker, 34 Bolton Rd., New Hartford, N. Y.

OCT. 2 - 4
IRE Canadian Electronics Conference.
Automotive Bldg., Exhibition Park, Toronto, Canada.
Contact: A. R. Low, c/o Canadian Electronics Conference, 1819 Yonge St., Toronto, Ontario, Canada.

OCT. 4 - 12
Electronic Computer Exhibition.
London, England.

OCT. 8 - 11
Systems and Procedures Association 14th Annual International Systems Meeting.
Statler-Hilton Hotel, Cleveland, Ohio.
Contact: Mr. Lawrence E. Melick, Sec. 1961 ISM, c/o Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio.

(continued on page 42)

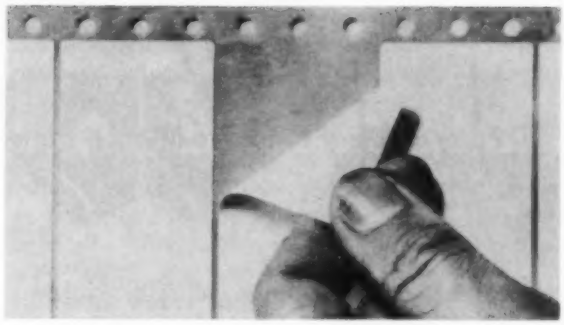
HOW AN INEXPENSIVE SELF-ADHESIVE LABEL ADDS NEW VERSATILITY TO DATA PROCESSING EQUIPMENT

"We first used Tabulabels for a simple, short-run mailing project. Now we know how many other valuable uses for these pressure-sensitive pin-feed labels can grow out of one small initial order."

The above Tab Supervisor's comment highlights an interesting trend in the EDP field. From the day Avery Label Company originated self-adhesive pin-feed labels for use with high speed forms tractor or pin-feed platen equipment, Tabulabel applications have steadily multiplied.

Avery credits its sales success to the inventiveness of Tab Supervisors. Data Processing people, intimately acquainted with their own needs, have created countless uses for versatile Tabulabels in coding, filing, addressing and indexing.

One customer uses Tabulabels for all mailings to customers, stockholders, vendors and employees. This same company uses Tabulabels to handle data revisions with an automatic typewriter linked to their card punch equipment – whenever a card is re-punched with new data, the changes are automatically typed on a Tabulabel for easy application to visual records. They also use Tabulabels to reclassify merchandise during inventory, to revise part numbers, and even to make revisions in their operating manuals.



Tabulabels are the original self-adhesive pin-feed labels for high speed EDP use. They are made of high quality, pure white, smudge-proof stock that assures clean, crisp appearance of all print-out data. They are easily removed from the backing paper for application to any clean, dry surface with finger-tip pressure. Tabulabels are available in 12" fan-fold and continuous roll form.

Tabulabels are convenient

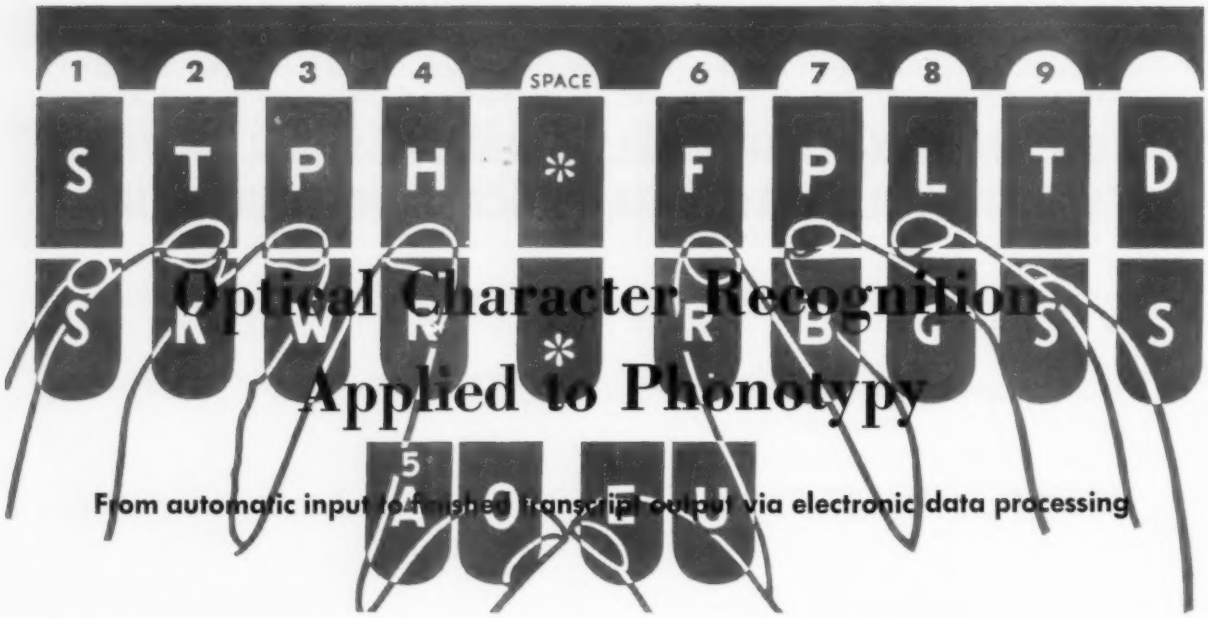
One of the major factors behind the run-away success of Tabulabels is their simplicity of use and convenience in handling. Slow, laborious hand typing is a..oided. Expensive, plate-type printing methods are virtually eliminated. Duplication of effort in data transcribing is avoided – any information existing on punched cards or tape can be transcribed using existing print-out equipment, at normal machine speeds, and without error. And Tabulabels are easy to apply at speeds up to 3,000 per hour using Avery's semi-automatic dispenser.

Tabulabels are manufactured under Avery's exacting quality control methods – pin-feed holes are punched cleanly to avoid "confetti." Special packages protect pin-feed edges to avoid "dog ears" and bent or torn margins.

"TABULABELS" is a registered trademark of Avery Label Company

AVERY LABEL COMPANY
A Division of Avery Adhesive Products, Inc.
1616 South California Avenue, Monrovia, California
Please send free samples and more information on Tabulabels:
NAME _____
COMPANY _____
ADDRESS _____

Circle no. 5 on reader service card.



Optical Character Recognition Applied to Phonotypy

From automatic input to finished transcript output via electronic data processing

SHORTHAND *per se* is a very old skill. Sufficient evidence has even been amassed to support St. Luke's use of shorthand to report the Sermon on the Mount. The basic types of shorthand (reduced or abbreviated graphic outlines) are phonography (manual) and phonotypy (mechanical). The former includes such systems as Gregg, Pitman, Munson, Thomas, Boyd, Ecletic, et cetera. In this country, the latter type embraces principally stenotypy and stenograph-y, employing the Stenotype and the Stenograph machines, respectively. In referring to machine shorthand, it is common practice to employ the terms stenotypy and stenotype generically.

Notwithstanding the type and system of shorthand used in any given situation, the notes must, for practical purposes, be transcribed. That is to say, a typescript is the end result. Some progressive-minded shorthand writers — particularly reporters — have, for years, made use of such intermediate devices as recording machines, dictating into them from the shorthand notes. Yet, it can clearly be seen that such a procedure is not necessarily a time-saving one, insofar as the transcript must still be prepared on the typewriter by the human element, a transcriber. With respect to machine shorthand, some shorthand reporters have trained transcribers to prepare transcripts direct from the reporter's taped notes. Hence, regardless of the approach taken, the transcript, of necessity, has been prepared indirectly.

Even as early as 1887, an advertisement indicated that machine shorthand was being introduced ". . . In keeping with the demands of the times and the progress of the age . . ." However, it was not until 1913, when Ward Stone Ireland invented the present Stenotype keyboard, that the machine gained favor. For some twenty years, the machine fought the battle of prejudice, fostered principally by various proponents of phonography. During the 1930's, though, phonotypy gained a foothold as a serious contender in the field of abbreviated written discourse. The remainder of the story is relatively old. Whenever and wherever verbatim speed and accuracy are required, the shorthand machine can be found at work.

In addition to the numerous advantages which phonotypy has over phonography, the former is now in a comparatively enviable position to ride the wave of automated progress. Such is due, clearly, to the fact that the very nature of phonotypy re-

By Dr. Vernon W. Stone

sults in (a) fewer personal distortions and (b) uniformity of notes. Accordingly, the mechanical advantages can and must be maximized. Phonography is not being considered at this point, for it is in the category of automated input for longhand writing. Yet, even more drawbacks are inherent, since an inordinate amount of personal distortion can result in the notes produced under speed pressure. Therefore, the writer does not consider manual shorthand to be a suitable consideration in this connection.

Electronic data processing has been employed for shorthand transcription purposes to a very small extent. However, the necessity of coding the data (the original notes) by means of the key punch, magnetic tape, magnetic paper, et cetera, has rendered the overall electronic application impractical. It is clear that the time spent coding shorthand notes for electronic transcription purposes could very well be spent transcribing them. The impracticality, therefore, has resided in the data input phase of the electronic process.

Possibilities seen

Pursuant to the relatively recent developments in effecting automatic input, some hope now appears to be on the horizon for automatic shorthand transcripts. In passing, let us mention RAI (random access and inquiry) and COBOL (Common Business Oriented Language), neither of which is considered appropriate for the task at hand. A closer look, however, should be given the following OCR (optical character recognition) methods, which are promising: MICR (magnetic ink character recognition) and OSR (optical scanning recognition). The automatic input success afforded by these two methods should induce manufacturers—Farrington, RCA, IBM, NCR, Addressograph-Multigraph, National Data Processing of Dallas, Remington Rand-Sperry, GE, et cetera—to meet the challenge. That is to say, they should seek to develop a typewriter-type electronic machine which will readily accommodate the original stenotypically taped notes as automatic input. Reasonably, such could well be a modification of some item of existing electronic equipment, designed to produce the finished transcript as its output.

Magnetic ink impractical here

MICR, at this point, is being dismissed by the writer as impractical for achieving the desired objective. The special electronic ink would not be a problem. It is the considered view of this writer, though, that the use of this method would necessitate some drastic changes in both the manufacture of the machine and the applied theory, resulting in virtually a new phonotypic system. It has been noted that MICR's use has been confined to numerals. The introduction of letters, in addition thereto, would, in all probability, tend to "confuse" the equipment in the decision-making step, for too many criteria would have to be considered. In view of the foregoing, the error rate, the rejection rate, the transcription rate, et cetera, would be substantially greater than zero. It must be emphasized that this writer's ruling out MICR as the promising method is not intended to convey the conclusion that this method cannot be employed for the subject purpose. There is every reason to expect and to hope that some enterprising, creative engineer can resolve the surface drawbacks and find a solution therein.

OSR, on the other hand, would seem to lend itself readily to converting the raw data—shorthand machine notes consisting of alphabetic letters and numerals—into a machine-processible form.

With respect to stenotype notes, the purposes for using a direct input method may be stated as follows: a) To permit the use of the stenotype tape as input, and b) To receive the finished transcript as output. Those are the overall purposes. From another point of view, however, purposes may be stated as speed, accuracy, and cost.

As applied to stenotype notes, OSR may be briefly described as follows: light is flooded on the stenotype notes as the uniform tape passes the reading station. As a result, light images are then created and are projected on a grid wherein the letters and numerals are determined on the basis of the internal storage data. Then, according to the programming of the electronic equipment, the finished transcript is produced according to directions.

The basic procedural steps may be enumerated as follows: a) spot-checking, proof-reading, and error-correction of the notes prior to the input (This is permitted insofar as the notes are both human readable and machine readable.); b) input (feeding the stenotype notes into the electronic equipment); c) signal pick-up, or sensing (by means of the scanner); d) signal processing, or standardizing (by converting specialized electronics to standard form); e) decision-making, or evaluating (by the operator's predetermined response or the electronic machine's selection on the basis of selected criteria); and f) output (the finished transcript of the stenotype notes).

Automatic input

In order to effect automatic input—the use of the original stenotype tape for electronic preparation of the finished transcript—certain requirements must be met: a) control over the source of printing the raw data at the source (The stenotype operator exercises such control, but human mediation is greatly reduced.); b) dimensional standardization of the stenotype tape (The standard stenotype paper is in folds 2⅜" wide by 8" long.); c) positioning of the stenotype notes on the face of

the tape (The tape is read from left to right and down. There are 22 points on a horizontal line, one representing each of the responding keys on the Stenotype, each of which has its own striking point, or position, on the tape.); and **d)** actual writing of the stenotype notes (This requirement is complied with as the stenotype operator records discourse.)

Stenograph

Pictured is the latest Stenograph keyboard (basically the same as the Stenotype keyboard). The noticeable difference is to be found in the locations of the *space* and the *asterisk* keys. The Stenograph produces a space by striking the upper-asterisk key with the numeral bar (Although two asterisks are shown, only one key is involved; the same is true for the double *S* at the extreme left of the keyboard.) The Stenotype produces a space by striking the space key (located where the Stenograph's lower-asterisk key is found).

It will be noted that there are two rows of ten keys each (a total of 18 keys since the double asterisk and the double S represent single keys), and four vowel keys, making a total of 22 keys. The numeral bar (long bar at the top) is depressed with the upper-row keys in order to write numbers. Hence, the upper-row letters and the numerals make use of the identical positions on the tape. That is to say, if F is depressed alone, F appears on the tape; but if F is depressed with the numeral bar, the numeral 6 appears on the tape.

The 22 keys always respond on the tape in their predetermined, reserved positions as follows:

STKPWHRAO*EUFRPBLGTSDS

Although it is not necessary, here, to cover the theory of stenotypy, suffice to say that it is a phonetic system of shorthand writing. Certain combinations of letters, as well as single letters, represent given letters. For example, initial L is represented by initial HR and final M is represented by final PL, which, of course, must be learned. There are also abbreviations for high-frequency words, such as U for You and B for be. Certain convenient letter combinations are employed for marks of punctuation, such as FPLT for a period and RBGS for a comma.

Stenotype alphabet

Following is the basic Stenotype alphabet on which standard stenotypy theory is based:

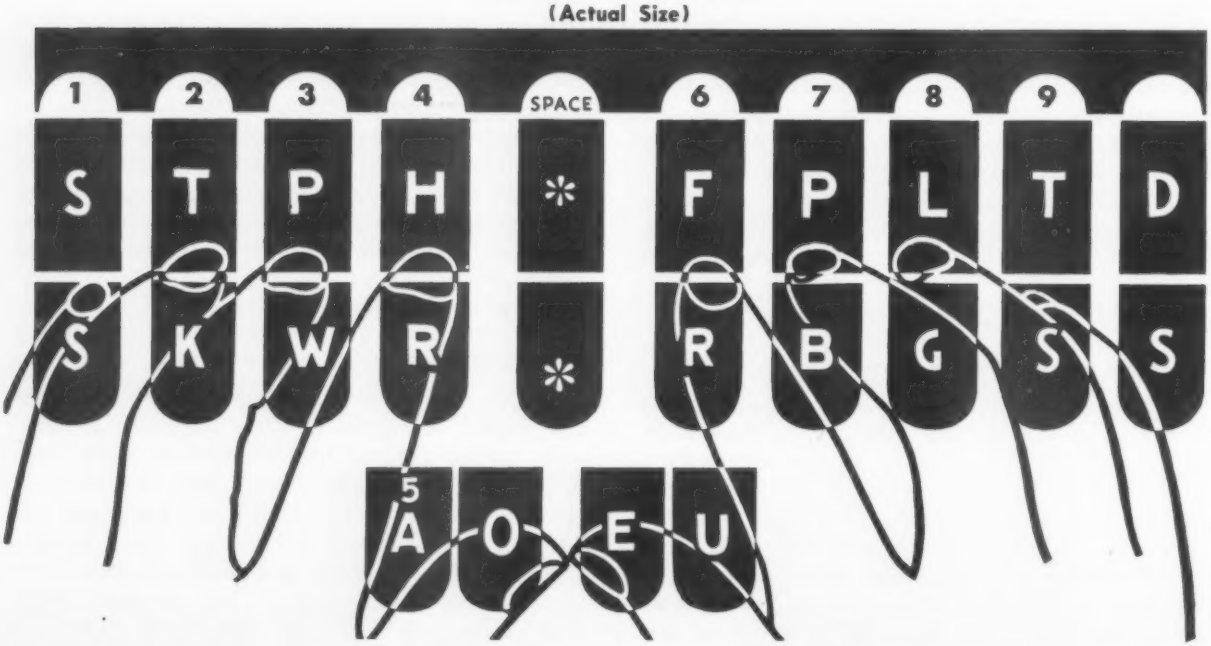
THE STANDARD STENOTYPE ALPHABET

LETTER	VOWELS	BEGINNING CONSONANTS (For starting words or syllables)	FINAL CONSONANTS (For ending words or syllables)
A	A		
B		PW	-B
C		KR	
D		TK	-D
E	E		
F		TP	-F
G		TKPW	-G
H		H	

(continued on next page)

STENOGRAPH® KEYBOARD

(Actual Size)



I	EU		
J		SKWR	-PBLG
K		K	
L		HR	-L
M		PH	-PL
N		TPH	-PB
O	O		
P		P	-P
Q		KW	
R		R	-R
S		S	-S (Below "D")
T		T	-T
U	U		
V		SR	
W		W	
X		KP	
Y		KWR	
Z			-S (Below "T")

N. B. The hyphen (-) before the final consonant does not appear on the stenotype tape; it is employed here to indicate isolated final consonants.

Following is the standard Stenotype punctuation:

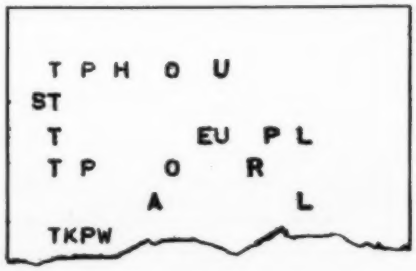
STANDARD STENOTYPE PUNCTUATION

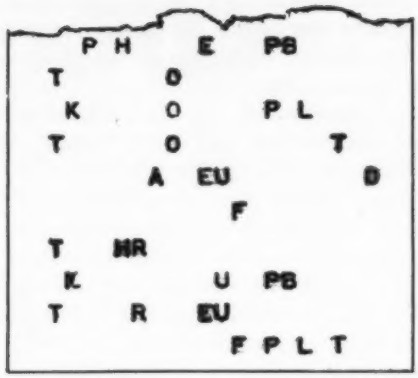
PUNCTUATION MARK		INDICATION
PERIOD	.	-FPLT
QUESTION MARK	?	-STPH
COMMA	,	-RBGS
COLON	:	-FPLT
		-FPLT
SEMICOLON	;	-FRPBLGTS
APOSTROPHE	'	AOE
SINGLE QUOTATION	'	AOE
DOUBLE QUOTATION	"	AOEU
EXCLAMATION	!	STKPWHR
HYPHEN	-	OE
DASH	—	OE
		OE
PARENTHESES	( )	STPH -FPLT
UNDERSCORE	——	SKWR -RBGS
PARAGRAPH	¶	*
		*

Also: KAP for one capital letter; KAPS for a word in all capital letters; * for correction; and space key for a space.

A familiar typewriting warm-up sentence is: Now is the time for all good men to come to the aid of their country.

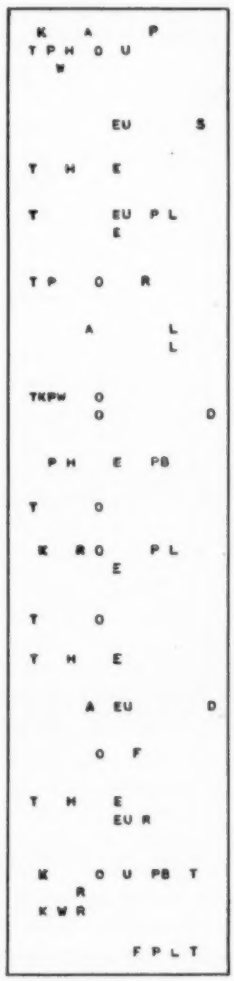
On the basis of standard stenotype theory, the sentence would be recorded as follows:





Modified stenotype

According to the author's modified stenotype theory—designed to afford automatic input—the sentence would be written as follows:



The modified (alphabetic spelling) form of recording is noted to be approximately two and one-half times as long as the basic theory form. This indicates that an understandable loss of speed has

taken place. It is recognized that the basic theory tape requires the human factor in the preparation of the transcript. If, however, there is to be any hope of mechanizing shorthand machine transcription, such hope would seem to reside in complete spelling, punctuation, and capitalization. Since the recording under this modified form is not as rapid as the basic theory form, there may be some concern as to whether or not the increased transcription speed will be compensated by the decreased recording speed. In testing the modified form, there was no question but that the overall recording/transcription time would be less than it would be under the basic theory form. In short, recording discourse by means of the modified form is several times faster than recording same by means of a typewriter! If progress is to be realized in automating the transcript, we must start at some reasonable point. This would seem to be such point, for automatic input necessitates the control of the writing at the source—by recording in a manner which the electronic machine can comprehend.

Principles for input

Certain basic principles have been formulated for the recommended modification. They are tentative, to be sure. It is anticipated that an electronic implementation may well effect additional principles. The principles are as follows:

1. Employ the alphabetic letters to spell each and every word in full—alphabetically rather than phonetically.

2. Use the space key (or a convenient symbol) to represent a space between words.

3. Indicate one capital letter by KAP and a word in all capital letters by KAPS, neither of which is to be followed by a space. (Such a usage necessitates programming in such a manner that the capital letter indications will not be transcribed as words; that is to say, if a word "KAP" were in order, the use of two or three lines for same would avoid electronic confusion with the one-line capital letter indications.)

4. Write letters separately if they are also used as one-letter combinations. That is to say, PL is a combination which represents final M. Therefore, if an M is required, such as in SAMPLE, the PL may be used in combination; but when the P and L are written, they must be written separately, thus avoiding the transcript's showing a second M.

Today, the principal users of OSR are oil companies, retail stores, manufacturing organizations, and the federal government. It is hoped that the transcript for the Stenotype machine can now be automated by the use of the direct input method. May the manufacturers in this area now accept the challenge to aid thousands of phonotypists—and numerous lines of business—by providing the wherewithal for an automatic transcript! ■

(continued from page 36)

OCT. 9 - 11
NOMA National Office Exposition.
Philadelphia, Pa.

OCT. 9 - 11
IRE, AIEE National Electronics Conference.
International Amphitheatre, Chicago, Ill.
Contact: Dr. William L. Firestone, Motorola Inc., Chicago, Ill.

OCT. 10 - 12
American Standards Association 12th National Conference on Standards.
Houston, Texas
Contact: ASA, 10 E. 40th Street, New York 16, N. Y.

OCT. 10 - 13
USE Meeting. Warwick Hotel, Philadelphia, Pa.
Contact: J. W. Nickitas, Sec. USE, Univac Division, Sperry Rand Corporation, 315 Park Avenue South, New York 10, N. Y.

OCT. 11 - 13
System Development Corporation and Office of Naval Research co-sponsored Conference on "Application of Digital Computers to Automated Instruction".
Department of Interior Auditorium, C Street between 18th and 19th Sts., N.W., Washington, D. C.
Contact: Washington Liaison Office, SDC, 1725 Eye Street, N.W., Washington 6, D. C.

OCT. 12 - 13
Univac Users Association Fall Conference.
Warwick Hotel, Philadelphia, Pa.
Contact: Walter Edmiston, Sec. Univac Users Association, Philadelphia Naval Shipyard, Philadelphia 12, Pa.

OCT. 12 - 13
NMAA 3rd Annual Division 5 Conference.
Marott Hotel, Indianapolis, Ind.
Contact: NMAA Conference, P.O. Box 256, Indianapolis 4, Ind.

OCT. 16
Association of Data Processing Service Organizations West Coast Management Symposium.
Ambassador Hotel, Los Angeles, Calif.
Contact: W. H. Evans, Exec. Vice Pres. ADAPSO, 1000 Highland Ave., Abington, Pa.

OCT. 16 - 17
PGEWS National Symposium on Engineering Writing and Speech.
Kellogg Center of Cont'd. Education, Michigan State University, East Lansing, Mich.
Contact: J. D. Chapline, Philco Corporation, 3900 Welsh Rd., Willow Grove, Pa.

OCT. 23 - 26
National Business Forms Associates Convention.
The Americana Hotel, Bal Harbour, Fla.

OCT. 23 - 27
National Business Show.
Coliseum, New York, N. Y.

OCT. 24 - 25
Computer Applications Symposium sponsored by Armour Research Foundation.
Terrace Casino, Morrison Hotel, Chicago, Ill.
Contact: Robert B. Brausch, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

OCT. 24 - 26
Electronic Representatives Inc., Michigan Industrial Electronics Exposition.
Detroit Armory, Detroit, Mich. ■

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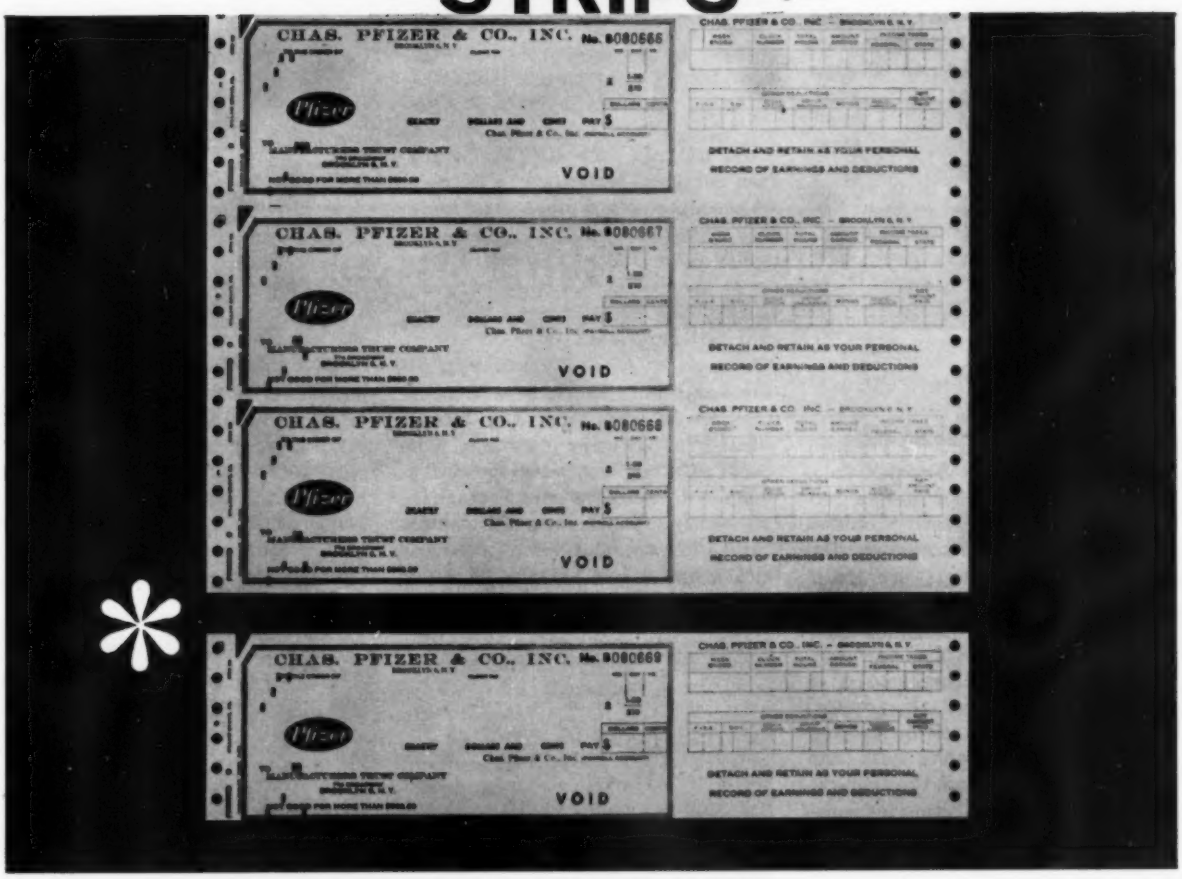

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NEW EQUIPMENT

NCR ON-LINE BANKING

The National Cash Register Company has developed an on-line record keeping system which processes 12,000 bank transactions hourly. Depositor account records are maintained in a central NCR 315 computer equipped with a card random access memory (CRAM). The computer is connected directly to NCR window machines at the central bank and, via leased telephone wire, at outlying branch banks. Less than a second is needed from the time the teller transmits transaction information through a window machine to the time the window machine begins to automatically print new balance information in the customer's passbook. Among other management data available from the system, the 315 can supply a net cash figure at any time of the day.

Circle no. 31 on reader service card.

1404 DUAL PURPOSE PRINTER

A new dual purpose printer is available with the IBM 1401 computer and may be ordered instead of the 1403 printer. Designated the 1404, the printer incorporates all of the basic continuous forms printing features of the 1403, and also is capable of printing on cards. The card printing and feeding mechanism will handle a single stack of 160 column cards (an 80 column card with an 80 column stub), or either one or two stacks of 51 or 80 column cards. Up to 25 lines can be printed on a card. The maximum card speed is 800 cards a minute, with two stacks feeding simultaneously and only one line per card being printed.

If prepunched cards are used, an optional read station makes card to

core comparison of up to 30 positions possible, as a verification that the right information from the 1401 core memory is being printed on the right card. It is also possible to punch information into cards at the 1402 read punch station, load the cards into the 1404, and print them while punching a new batch of cards on the 1402.

The 1404 can be used with any model B, C, E, or F 1401 system, but cannot be field installed. Delivery time is 24 months. Rental and purchase prices are as follows:

Equipment	Monthly Rental	Purchase
1404 printer	$1,550	$85,500
1404 adapter	25	1,380
1404 reading station	175	9,750
adapter for reading station	75	4,250

Circle no. 32 on reader service card.

NEW IBM EQUIPMENT

IBM has five new pieces of equipment which extend the information retrieval capacities of the 1410, 7070, 7074, 7080, and 7090 computers. One of the new items is the 1301 disk file, a very large capacity high speed unit similar to the disk file developed for STRETCH class computer systems. The other four new equipment items are data transmission devices for the 1410 computer.

1301 disk file

The new disk file can be linked to any of the five computers listed above, or shared by any two of them. Each 1301 file unit holds one or two stacks of 20 disks. Maximum capacity of one unit is 50 to 56 million characters, depending on the computer employed, and up to five 1301 units may be used with any of the five computers.

The 1301 has a read/write head for each of the 40 disk surfaces in a stack, aligned vertically at the ends of a comb-like arrangement of access arms. The 40 read/write heads are thus positioned at any given time over 40 concentric disk tracks, so that as many as 102,000 characters in a single stack, 204,000 characters in a two-stack file unit, or 1,020,000 characters in a maximum system of five file units may be reached with no search motion. Like the STRETCH disk file, the provision of a read/write head for each disk face eliminates vertical search movement entirely, and careful organization of the information stored can result in a minimum of horizontal movement of the access arms.

The transfer rate from the 1301 to core storage is 75,000 to 90,000 characters a second, which is faster than many tape systems. In addition to providing large capacity for the common uses of random access files, such as maintaining a complete inventory record system for random transaction processing, the high transfer rate and capacity of the 1301 offer other interesting possibilities. One of these is the idea of storing an installation's complete file of computer programs on the disks. Set up time can thus be reduced from several minutes to a few seconds, which could be significant in a heavily scheduled installation and particularly where a large number of scientific routines are processed which presently may take less time to run than to set up.

First deliveries of the 1301 are scheduled for the fall of 1962. Typical prices of a two-stack file unit, including required control units, adapters, and/or data channels but not including the cost of the computer, are as follows:

Computer	1301 Monthly Rental	1301 Purchase
1410	$4,400	$231,100
7070	6,785	325,000
7074	6,535	315,500
7080	6,185	301,500
7090	7,135	339,500

Up to four additional file units may be linked to any of the five computers, without additional control equipment, at the following basic prices:

1301 model 1 (one stack): $2,100 monthly rental, $115,500 purchase;

1301 model 2 (two stacks): $3,500 monthly rental, $185,500 purchase.

Circle no. 33 on reader service card.

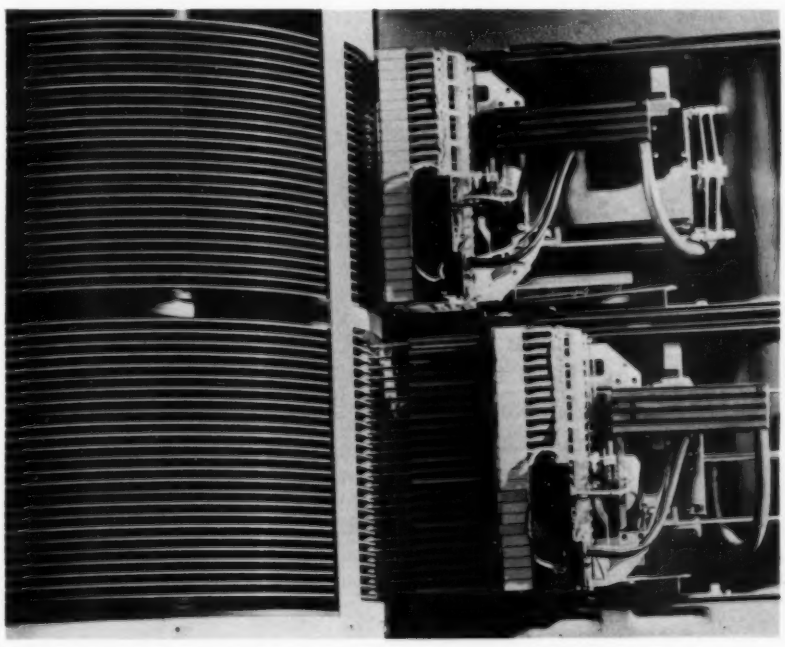
Data transmission equipment for 1410

The IBM 1410 intermediate size computer now can have direct two-way communication with telegraph sending units, typewriter sized inquiry stations, magnetic tape terminals, and a 1401 or another 1410 computer.

Telegraph input/output

Using two to four data channels, this new feature makes it possible to link remote telegraph units to the 1410 magnetic core memory over

(continued on next page)



◀ The reading and writing action of the new IBM 1301 disk storage unit is shown here. Banks of comb-like access arms sweep horizontally over the surfaces of disks spinning at 1,800 r.p.m.

Upper module of 25 disks (upper left) is being searched for data by a hydraulic mechanism containing access arms which has moved inward toward center of disk surfaces.

Lower bank of access arms has moved outward from center of file, positioning read/write heads, just visible, at outer edge of disk surfaces.

standard telegraph lines. The feature makes the necessary translation each way between telegraph and 1410 codes.

The 1410 telegraph input/output feature will rent at $500 a month and is priced at $30,500. It will be available in the fall of 1962.

Circle no. 34 on reader service card.

1009 transmission equipment

A new 1009 adapter unit makes the 1009 data transmission unit usable with the 1410. The 1009, originally developed for direct communication between 1401s, has also been revamped by IBM, increasing the transmission rate from 150 to 250 characters a second.

Using the 1009, a 1410 may transmit data directly between its core memory and another 1410 or 1401 core memory or a magnetic tape terminal in a remote location.

Available in the fall of 1962, the adapter rents for $200 monthly and may be purchased for $11,000. The improved 1009 data transmission unit is priced the same as the earlier version of the 1009.

Circle no. 35 on reader service card.

1014 remote inquiry unit

The 1014 has a 44 character keyboard on which an inquiry may be typed and transmitted to the 1410 computer. The reply is printed out at the inquiry unit. A maximum of 20 inquiry units, located up to eight wire-miles from the computer, may be connected to a single 1410.

Use of the 1014 requires an adapter for the 1410 which rents for $200 a month and sells for $11,500. Up to 10 inquiry units may be used with a single adapter; use of 11 to 20 units would require a second adapter. Available in the fall of 1962, the 1014 inquiry units will cost $11,000 and rent at $200 a month.

Circle no. 36 on reader service card.

DIGITAL DATA PROCESSOR

Computer Control Company has a new computer, the Digital Data Processor, designed primarily for scientific, engineering and statistical work. The DDP is a general purpose stored program computer of solid state construction. It has a basic magnetic core memory of 4,096 words, expandable to 16,384 words, each word composed of 25 bits. Access time to any address is 2.5 microseconds; memory cycle time between accesses is 5 microseconds.

The DDP uses a standard Friden Flexowriter as its basic input/output device, but may also use paper tape, magnetic tape, punched cards, line printer, digital plotter, and analog input and output.

Fifty-two operation codes are standard on the DDP. Not including access time, the add time is two microseconds; divide time is 60 microseconds; multiply time is 40 microseconds. One index register is standard, with optional capacity for two more. Subroutines are available in fixed point, floating point, and double precision, and there is also a compiler for the DDP. The purchase price of a basic system is $140,000.

Circle no. 37 on reader service card.

■

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(continued from page 22)

seconds. This ability to feed cards earlier is translated into valuable time savings in processing cards. If, for instance, cards took up to 35 milliseconds to process, a 1402 with this feature will operate at 600 cards per minute whereas a standard 1402 would operate at 400 cards per minute.

The new disk random access unit for the 1410 system is so important in its own right that it deserves special treatment in a future column. This device, the 1301, overcomes the deficiencies of earlier disk storages and is the forerunner of a move toward greater emphasis on random access type storage rather than sequential storage on magnetic tape.

■

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Circle no. 6 on reader service card.

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PRODUCTS AND SERVICES

IBM CONTROLLER

IBM will manufacture a new data transmission traffic control unit for use in its tele-processing systems. The machine will receive and convert information from remote terminals and feed it directly into a computer for processing. Output from the computer will proceed directly through the control device to the remote terminals, under control of either the computer or the terminals. Described by IBM as a stored program input/output control device, the machine will be able to determine a priority sequence for the data it handles and will have temporary magnetic storage of up to several thousand words.

Circle no. 40 on reader service card.

LABEL NUMBERING DEVICE

A new numbering device is available from Weber Marking Systems, Incorporated, and can be factory installed on any Weber label printing machine. The device handles either six (standard) or seven digit wheels with a variety of sizes of roman or gothic type, and can number consecutively, with two to eight duplications, or repetitively. The device is priced at $200.

Circle no. 41 on reader service card.

AUTOMOBILE DEALER SERVICE

Automated Systems International has been formed to provide data processing services to automobile dealers. Stock status, sales analysis and other management reports will be processed for client dealers on a 15 day cycle, along with purchase orders (indicated by the stock status report) which the dealer may review and use if he wishes. ASI's system involves supplying the dealer with prepunched stock cards, which are processed by ASI upon their return, so no equipment need be installed by the dealer.

Circle no. 42 on reader service card.

COBOL-61

COBOL-61 is a revised report available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., and was prepared for the Conference on Data Systems Languages by a special task group representing 11 computer manufacturers, the Department of Defense and other major users of computers.

COBOL-61 updates the COBOL report issued in April, 1960, which set out the initial specifications for the Common Business Oriented Language. To date, 12 American and two European manufacturers have made commitments to implement COBOL-61 on over 30 models of computers. The implementation schedule of 13 of these computer manufacturers is as follows:

SCHEDULE FOR DEVELOPMENT OF COBOL-61 COMPILERS

Company	Model of Equipment	Target Date for Compiler
Bendix Computer Div.	G-20	1962
Burroughs Corporation	B-5000	Customers will be able to program in COBOL from a programming manual which will be made available in August, 1961. The operating compiler will be available for customer use in 1962.
Control Data Corporation	CD-1604	February, 1962
	CD-924	February, 1962
Ferranti, Limited	Atlas	Not yet established
General Electric Co.	GE-225	September, 1961
	GE-304B	July, 1961 (joint implementation with NCR)
International Business Machines Corporation	705-II without input/output	Fourth Quarter of 1961
	705-III/7080	Fourth Quarter of 1961
	709/7090	Fourth Quarter of 1961
	7070/7074	Fourth Quarter of 1961
	1410	Fourth Quarter of 1962
	1401 (with 12,000 and 16,000 positions of memory)	First Quarter of 1962
	1401 (with 4,000 and 8,000 positions of memory)	Second Quarter of 1962
International Computers and Tabulators, Limited	ICT-1301	1962
Minneapolis-Honeywell Regulator Company	MH-400	Last Quarter of 1962
	MH-800	Last Quarter of 1962
National Cash Register Co. (joint implementation effort with General Electric Company)	NCR-315-Tapes	January, 1962
	NCR-315-CRAM	May, 1962
	NCR-304A	July, 1961
	NCR-304B	July, 1961
Philco Corporation	2000 series computers (210, 211, and 212 main frames)	October 1, 1962
Radio Corporation of America	RCA-301	First Quarter of 1962
	RCA-601	Third Quarter of 1962
	RCA-501	COBOL Narrator completed in 1960 (COBOL-60)
Remington Rand UNIVAC	UNIVAC II	Completed in 1960 (COBOL-60)
	UNIVAC Solid State	
	a. Compilation on UNIVAC II	March 1, 1961 (COBOL-60)
	b. Compilation on USS/Tapes	Third Quarter, 1961 (COBOL-61)
	UNIVAC III	Second Quarter, 1962 (COBOL-61)
	UNIVAC 1107	Third Quarter, 1962 (COBOL-61)
	UNIVAC 490	Third Quarter, 1962 (COBOL-61)
Sylvania Electronic Systems Data Systems Operations	9400	First version, December, 1961
	MOBIDIC	First version, May, 1962
	(other Fieldata equipment compiled on MOBIDIC — completion dates contingent on Army plans)	

Circle no. 43 on reader service card.

FORMS CONVEYOR

Laclede Gas Co., St. Louis, Mo., has installed a conveying system in its customer service office which speeds service forms from telephone message centers to a classification and dispatching operation. Laclede Gas created the system in collaboration with engineers at Alvey Conveyor Mfg. Co., St. Louis.

Incoming telephone calls are switched to the proper service department section where they are handled by telephone service personnel. Each service operator has a complete file of customers at his fingertips. When the call is completed, the information is entered on a punched card or application for service form, and placed into a guide rack installed over a narrow belt conveyor.

The forms, traveling at a rate of 100 feet per minute, are transferred to a receiving belt conveyor which carries them to a collecting point where they are discharged into a box, tabulated and classified. Forms are then sent to an adjoining room where they are transmitted via teletype to one of three field service offices. At the field service office the information is relayed by phone or radio to maintenance trucks.

Circle no. 44 on reader service card.

PHILCO 2000 PROGRAMMING AIDS

Each user of a Philco 2000 electronic data processing system is supplied with a library tape containing frequently used scientific and business routines which may be called into a program when required. Routines may be added to or deleted from the tape. A number of automatic programming systems are also available, including TAC, or Translator-Assembler-Compiler; AL-TAC, a compiler which accepts either ALTAC or FORTRAN algebraic statements and translates to TAC; IOPS, used for conversion and editing of input and output data; and TOPS, or Total Operation Procedures System. A COBOL system will soon be available for the 2000.

Circle no. 45 on reader service card.

ENGLISH WITHOUT SYNONYMS

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(continued on next page)

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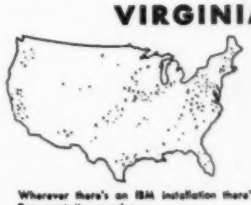

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Circle no. 14 on reader service card.

from photographs, Planning Research Corporation has compressed the English language into about 6,000 unambiguous terms. The resulting vocabulary contains no synonyms. Called "standard language" by PRC, it uses only five parts of speech: substantives, descriptors, activity predicators, relational connectors, and interrogative operators. Developed for both military and industrial information areas, the standard language permits exact indexing, filing, and consequent retrieval of data.

Circle no. 46 on reader service card.

DATA TRANSMISSION SYSTEM

Ampex Corporation and Alden Electronic and Impulse Recording Equipment Company have teamed up to produce a new data/facsimile transmission system which uses magnetic tape for data storage. The tape unit used is the Ampex FR-100B instrument recorder/reproducer.

The FR-100B is coupled to two Alden scanner/reproducers, a high speed 960 rpm unit and a low speed 120 rpm unit. Incoming data is recorded on the Ampex tape for later reproduction on either of the Alden units. Unattended receiving is possible since start and stop signals can be given from or to remote units. Data may be accumulated on magnetic tape for transmission during off-hours.

Circle no. 47 on reader service card.

NEW BENDIX DEPARTMENT

Bendix Computer Division will provide new programming systems for its customers through its new systems programming department. The department will continue the work done earlier by Bendix which produced the SPACE family of program systems for the G-20, including the SPAR symbolic assembly routine, ALCOM compiler, COBOL, and the EXECUTIVE system control.

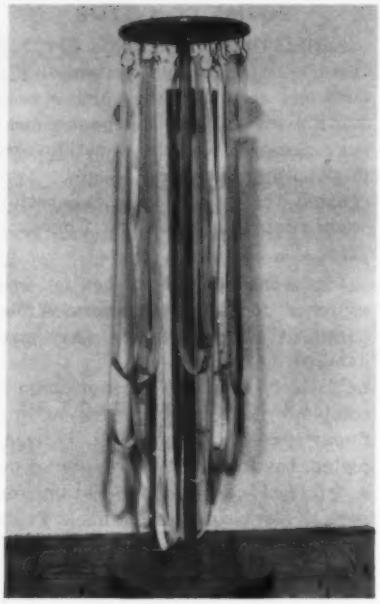
Circle no. 48 on reader service card.

ON-LINE TAPE CONVERTERS

Minneapolis-Honeywell has announced the 836 and 436 tape control units for on-line translation between IBM magnetic tapes and the Honeywell 800 and 400. With the 836, IBM tape transports are used to read IBM tapes; the information is translated into Honeywell code and sent directly into the 800 computer. Output from the 800 is translated by the 836 into IBM tape code and written directly onto IBM tapes. The 836 is fully automatic. The 436 works with the Honeywell 400 computer in the same way, except that the 436 requires a programmed conversion. The 836 rents for $1,950 a month and can be purchased for $93,600. The 436 rents for $975 monthly and has a purchase price of $43,875. Delivery time for either machine is 12 to 15 months.

Circle no. 49 on reader service card.

Ampex's FR-100B general purpose recorder/reproducer (center) is teamed with Alden's new high speed 960 rpm scanner/reproducer (left) and the Alden low speed 120 rpm scanner/reproducer (right) in demonstration of low cost facsimile transmission system.



PAPER TAPE RACK

Dresser Products has a paper tape loop storage and feed rack that holds a large number of tapes on 16 hangers and rotates so that any desired tape can easily be brought into position. Besides serving as a storage device, the rack may also be used as a feed rack, for long tapes can be processed by conventional paper tape readers without removing them from the rack.

The rack is 50 inches high, 15 inches in diameter, and is set on ball casters. It is available with an outrigger attachment to handle extra long tape loops, and with a locking cabinet.

Circle no. 50 on reader service card.

CORE, INC.

Computer Oriented Research and Engineering, Incorporated (CORE, Incorporated) has been formed in Pittsburgh to provide service bureau facilities and hourly rental of its large scale electronic computer. Financed by Apollo Industries, Incorporated, the new company will specialize in scientific and engineering calculations, but will also serve as a general purpose bureau handling business data processing routines. Although CORE, Incorporated will have a service staff, customers will be encouraged to use their own personnel for programming, data preparation, and equipment operation as a means of saving money.

Circle no. 51 on reader service card.

FAN-FOLD LABELS

Four new stock sizes of fan-fold self-adhesive Tabulabels have been introduced by Avery Label Company. Twin-Tabs, 15/16 x 3½ inches, are packed 10,000 to a carton and are designed for dual printing. The other new sizes are 1-7/16 x 4 inches, 15/16 x 3½ inches, and 15/16 x 5 inches, and are packed 5,000 to a carton.

Avery also has a new dispensing machine, the E7-6, for its pressure sensitive labels. The dispensing unit is operated by a foot switch, with speed regulated by a dial setting.

Circle no. 52 on reader service card.

PAPER TAPE RECORDER

Datex Corporation has a paper tape recording station (model 90-210-01) which will receive and punch input data from up to 50 DL-210 input stations. Data are punched at 60 characters per second in the code required for further processing in the user's data processing system. The equipment includes pre-recording error checking and indication for message completeness, orientation and, for card input, blank columns, and also performs a parity check of each character and of the number of characters during transmission. Up to 10 message formats may be handled, and output may be 5, 6, 7, or 8 channel tape. If two of the recorders are used in the system, an automatic transfer feature is available which will switch operation to the second recorder if the first runs out of tape or malfunctions.

Circle no. 53 on reader service card.

CHARACTER GENERATOR

Sixty-four different alphanumeric characters and symbols are generated for display at up to 50,000 characters per second by CBS Laboratories' VIDIAC 3SG-10 character generator. Of solid state construction, the 3SG-10 accepts digital input over six parallel binary coded lines with any specified code and generates characters with a resolution equivalent to a 10 line TV raster scanning system. Excluding power supply, the character generator is 26½ inches high, 12 inches deep, and 19 inches wide, and may be mounted on a standard relay rack. Delivery time is 60 days.

Circle no. 54 on reader service card.

PHILADELPHIA DATACENTER

IBM has opened its sixth Datacenter, this one located in Philadelphia. The facility includes a 7070, two 1401s, and peripheral equipment. In contrast to the full services featured by The Service Bureau Corporation, including programming, testing and machine operation, the Datacenters are set up so that customers may do their own programming and operation, and rent only machine time on an hourly basis. Two Datacenters are located in New York City, and one each in Cleveland, Chicago and Los Angeles.

Circle no. 55 on reader service card.

NEW BOSTON SERVICE BUREAU

Nationwide Tabulating Corporation has opened a new service bureau in Boston, part of an expansion which will see the establishment of a network of at least 10 such centers throughout the country. In addition to standard electronic data processing equipment, the Boston office will use Cummins photo-electric scanning equipment to read installment payment coupons for its customer companies.

Circle no. 56 on reader service card.

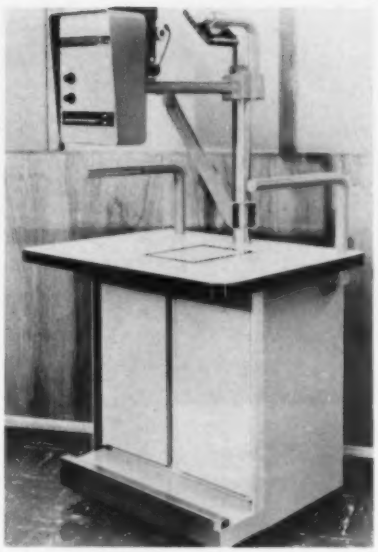
CONTINUOUS FORM FASTENER

TAB-FLEX is a fastening method for continuous forms announced by Clarkson Press. The forms contain neither staples nor solid-line glue, but have tiny flaps cut in the margin and glued from part to part.

Circle no. 57 on reader service card.

MICROFILM CAMERA

A high resolution microfilm recording camera using stroboscopic lighting has been introduced by FMA, Incorporated, as part of its FileSearch information storage and



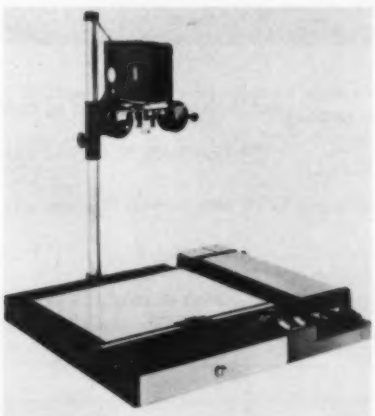
retrieval system. The camera simultaneously puts a code field and document image onto frames of microfilm, and is integrated with a filming table and strob lighting fixtures into a unit 78 inches high, 38 inches wide, and 30 inches deep.

Circle no. 58 on reader service card.

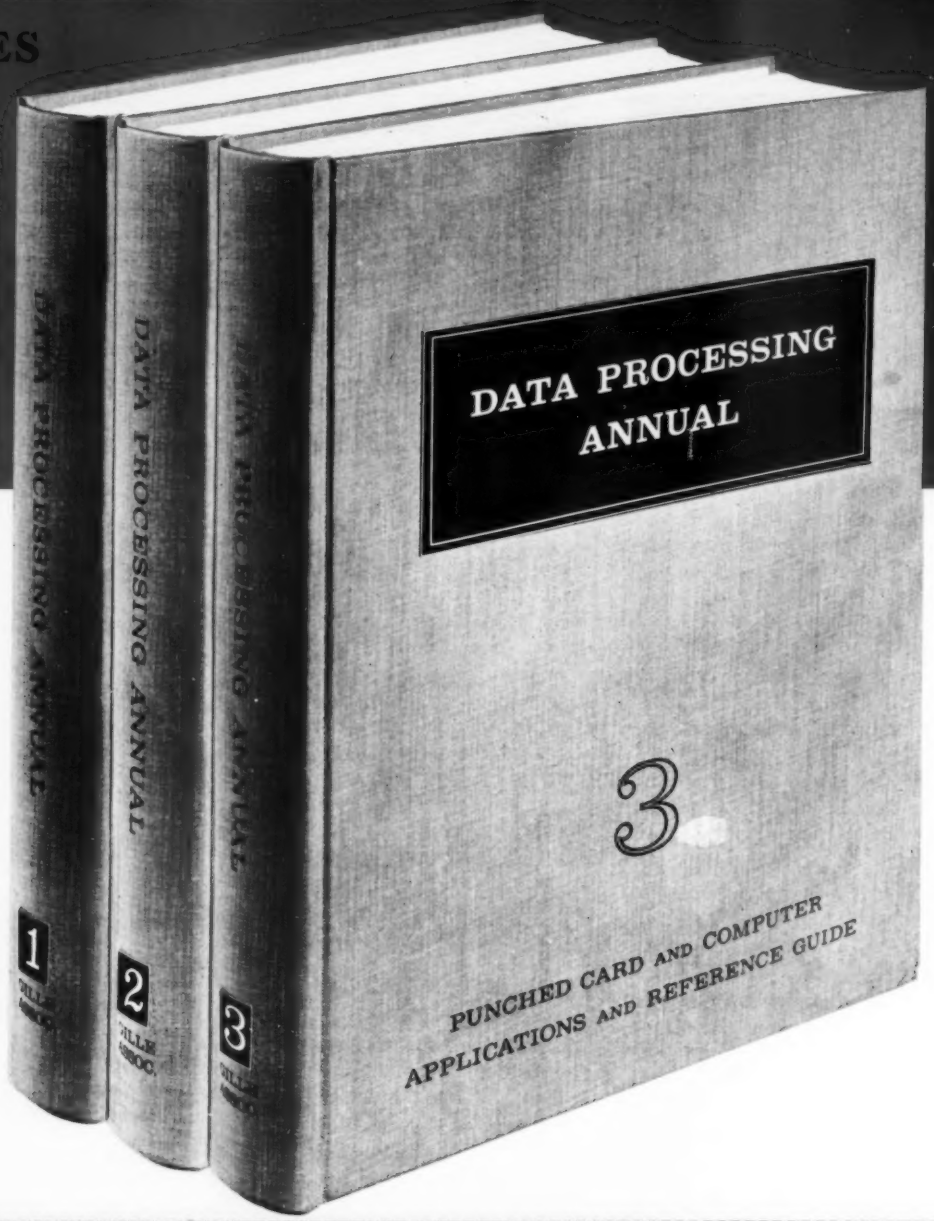
FEDERAL MICRO-MATE

Two new microfilm reader-printer-copiers have been announced by Federal Manufacturing and Engineering Corporation. The Federal Micro-Mate accepts microfilm transparencies of either 16 or 35 mm. size, strip film and IBM card mountings. Prints up to a size of 18 x 24 inches (9 x 14 inches on the Micro-Mate Jr.) are made in about 10 seconds. No darkroom is required and the slightly moist prints dry in less than a minute at room temperatures. The Micro-Mate is priced at $695; the Micro-Mate Jr. at $395.

Circle no. 59 on reader service card. ■



NEW SERIES



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NOTABLE QUOTES

"If you make an informed examination of the high quality and low cost of optical goods from Japan, machinery from England, and both from Germany, you might well ask, 'How has American industry managed to compete?' A large part of the answer lies in the *mechanization of our processes.* For example, in our own company an average of $62,737 is invested in plant and property for each employee, and a significant portion of this is in working equipment.

"One of the most dramatic new tools is the electronic computer, about which two things are apparent: *it multiplies the productivity of employees in a wide area beyond those directly involved;* and this tool is only on the threshold of its potential usefulness."

Computer Future. **Management News Letter.** Standard Oil Company of California. Number 175. April, 1961.

□

"Automating a principal bank funtion without updating the peripheral activities surrounding it is like taking a three day camel trip to board a jet airliner for a 600 mile-an-hour ride.

"Everybody wants to tinker with the jet, but no one does anything about the camel. And the reason they don't is they don't know it is there. The real problem is not to get rid of the camel, but to recognize that you have one. And to do this, you need a yardstick against which you can measure your operation."

John N. Raleigh, at the Twelfth Southern Regional Convention of NABAC held in May at Tulsa, Oklahoma.

AUTHORS

(continued from page 4)

DR. VERNON W. STONE *(Optical Character Recognition Applied to Phonotypy)* is professor of business administration at Maryland State College, a division of the University of Maryland, and is head of the department of business. He formerly taught at public schools in Cincinnati, Chicago, and Seattle, at Savannah State College, Ga., Florida A & M University, Tallahassee, and Ricker College, Maine.

He received an A.B. in English from Roosevelt University, Chicago; M.B.A. with Honors from the University of Chicago; and a Ph.D. in psychology from the University of California, Berkeley. Dr. Stone covered the Nuernberg Trials (employing Gregg shorthand and stenotypy), and later was on Dr. Ralph Bunche's staff for the Israel truce negotiations.

He has published two books on stenotypy, plus numerous research studies and articles in the fields of statistics, psychology, business, economics and mathematics.

FRANCIS M. WEBSTER, Jr. *(Why Management Games?)* graduated from the University of Missouri with a B.S. degree in chemical engineering in 1952. In 1958 he received his M.S. degree from the Graduate School of Industrial Administration, Carnegie Institute of Technology. He has had experience as a process engineer in natural gasoline fractionation and in the rate department of a natural gas company.

Prior to joining Chrysler Corporation he was a consultant with H. B. Maynard and Company.

At Chrysler, Mr. Webster has been engaged in developing integrated computer systems, particularly in the sales area. His interest in management games stems from an avid interest in modern organization theory as developed by Barnard and Simon. ■

SEEN IN PRINT

POTENTIALS OF PUNCHED CARD EQUIPMENT, by G. S. Thomas, Journal of Machine Accounting, May, 1961.

People play a greater part in the successful establishment of a data processing system than machines. Lack of cooperation and resistance to new systems which cut across organizational lines can result in inefficient utilization of equipment. This problem has been apparent for years in the traditional way in which punched card systems have had to be developed little by little, against the resistance of persons who felt the new applications would reduce their authority. Actually, all necessary authority can remain in the hands of the affected department chiefs even when some of their data processing functions are centralized on punched card or computer equipment. Such integrated systems, regardless of the specific machines used, are necessary to the efficient processing of the data. The author estimates that the establishment of a good punched card application will reduce the paperwork time from 1,000 manual man-hours to 170 man-hours; and that the substitution of a computer will only reduce this time to 150 man-hours.

DATA . . . yours for the asking

ALFAX PAPER AND ENGINEERING Company is offering an eight page technical bulletin on Alfax Type A Paper, which is an electrosensitive recording paper. The bulletin lists specifications on writing speeds, response and other characteristics of this type of paper which is used in business facsimile, picture transmission, underwater sound recording, seismic profiling, spectrum analysis, ultrasonic flaw detection, radar and other instrumentation.

Circle no. 70 on reader service card.

"IDEAS that make data processing equipment more productive" is an eight page brochure that details uses of able-stik, pin feed pressure-sensitive labels. It is produced by the Allen Hollander Company.

Circle no. 71 on reader service card.

WESTREX DIVISION of Litton Systems has detailed specifications of their RA-1651 signal-actuated voice recorder in a four page brochure. This recorder is designed for use where a record of all messages must be kept continuously, such as in police and fire department communication systems.

Circle no. 72 on reader service card.

A REPORT on the Philco 2000 asynchronous operated computer has been offered by Philco's Government and Industrial Group. Copies are available.

Circle no. 73 on reader service card.

PRESTOSEAL Manufacturing Corporation has published a 12 page brochure/catalog covering the company's history and inventions, which catalogs film and tape splicers, and aperture-mounting machines.

Circle no. 74 on reader service card.

OMNITRONICS' new literature pictures their PTR-71 photoelectric tape reader, with complete specifications.

Circle no. 75 on reader service card.

■ ■ ■

PEOPLE AND PLACES

NEW OFFICERS of the Metropolitan Detroit chapter of ACM are: *Dr. Bernard Galler*, president; *William Sweeney*, vice president; *Thomas Campbell*, secretary; and *Charles Wilkins*, treasurer.

AUERBACH ELECTRONICS Corporation has added a new director of advanced programs, *Roger L. Sisson*, and two new technical staff members, *George C. Gingrich* and *Frederick W. Mumma*.

BENDIX COMPUTER'S new director of industrial relations is *Joseph Ward*.

BURROUGHS appointed *Frank Nascenzi* as director of administration of their Manufacturing and Engineering division.

CONTROL DATA Corporation made three organizational changes, resulting from a contract for POLARIS submarine computers: *A. O. Hoistad* is the manager of the newly formed manufacturing department; *C. L. Hiatt* is now manager of quality assurance; and *E. D. Zimmer* is manager of the systems and engineering department.

GAINE ENGINEERING Company of Detroit has been appointed midwestern sales representative for the Weinschel Engineering Company of Maryland.

GENERAL DYNAMICS ELECTRONICS' new appointee as general manager of military products is *Robert J. Gilson*.

GENERAL ELECTRIC has *Robert J. Brown* as new general manager of the company's multi-million dollar ground and shipboard military electronics business.

HONEYWELL'S EDP division appointed six representatives to coordinate the sales of computers to these federal agencies: *L. W. Armstrong* (Army); *Richard P. Coleman* (Navy); *Lee C. Bramlette* and *Robert C. Hall* (Air Force); *Filmore M. Dobbs* (NASA and other aerospace agencies); and *Oscar M. Lurie* (non-military).

IBM promoted *Warren C. Hume* to president of the data processing division, succeeding *Gilbert E. Jones*, who was moved to assistant to the president of IBM. Other promotions: *Jerrier A. Haddad* became vice president and assistant general manager of data systems; *George A. Kennard* was promoted to general manager of advanced systems development; and *Dr. Charles R. DeCarlo* was appointed director of education. Other changes include *C. Drago Aser*, manager — services to consultants; *Gordon M. Moodie*, general manager of the electric typewriter division; and *Richard W. Brown*, director of personnel.

ITT's new deputy general manager for the Latin America area is *John McK. McLean*.

TRIAD TRANSFORMER Corporation, a division of Litton, has appointed a sales promotion manager, *Miss Jeann C. Nielsen*.

LOMA has named *Edmond H. Curcuru* as director of education and training.

PHILCO Corporation named *Edward F. Canfield* as assistant to vice president of marketing, and *Robert F. Burns* as senior sales representative (Washington, D. C.) for the government and industrial group.

HONEYWELL official, George M. Muschamp, said a new era in *industrial automation* will wed automatic plan controls to office data processing equipment. This will produce more goods more economically, but will require more education to fit people for the job to be done.

LOMA (Life Office Management Association) will hold its annual business meeting at their Conference in Washington, D. C. on September 26. Nominations for officers are already being prepared by the nominating committee.

LARC I is on a 24 hour a day, six day a week operation at the Lawrence Radiation Laboratory of the University of California.

RCA 501 User Association elected *Albert D. Bosson* of the Connecticut Life Insurance Company as president.

SYSTEMS & PROCEDURES Association elected *William J. Bates* as international president for 1961-62.

TRW's Pacific Semiconductors, Inc. has two new board members: *Richard A. Campbell* and *Dr. Ralph P. Johnson*. TRW appointed *Q. T. Wiles* as vice president, marketing, for its components.

UNIVAC, St. Paul, promoted *Paul F. Ives* to assistant manager of personnel and *Harold W. Hecker* to manager of data applications. *Richard P. Castanias* was appointed national sales manager for Univac Scientific computing systems. *Thomas H. Armstrong* is now manager of government relations for the Univac division, and *William R. Lonergan* became manager of product planning and applied programming. ■

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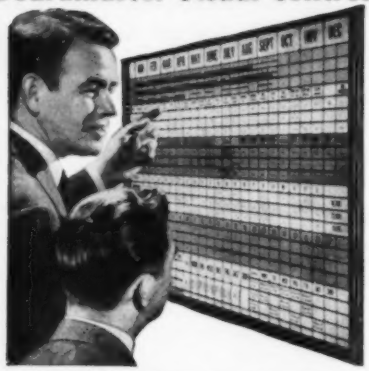

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BOOK SHELF

MANAGEMENT GAMES by Joel M. Kibbee, Clifford J. Craft and Burt Nanus. Reinhold Publishing Company, 430 Park Avenue, New York 22, N. Y. 1961. 343 pages.

This book is the first to give a comprehensive treatment to the subject of management games. It discusses problems of design and administration of both computer and manual games from the point of view of the management development man who must use them as part of his total educational effort. The authors draw upon their considerable experience with this new technique — two of them having been part of the team which built the original American Management Association exercises and the third being in charge of Remington Rand Univac's efforts in this area.

The authors discuss the history and future of management games with a particular emphasis on why, where and how they should be used. A chapter on the present state of the art is based upon a special survey conducted for the book in which over 200 experts in the field were polled as to their activities and ideas. Detailed case studies written by the game designers and training directors of some of the pioneers in the use of games — The Pillsbury Company, General Electric, Westinghouse and Imperial Oil, among others — are also included in an attempt to make the book as representative and definitive as possible. A 20 page reference section describes the basic characteristics of approximately 100 games and tells the reader who to contact for further information.

The basic premise of the book is that a management game can be a very powerful educational tool for certain training objectives if it is properly used. The authors are firmly convinced that this technique will have at least as much impact upon business education as the introduction of the case study did more than 30 years ago. They foresee a considerable expansion in the number and types of games available and an extension of the technique into other areas of business research.

PUNCHED CARDS by J. Sandford Smith. MacDonald & Evans, Ltd., 8 John St., London, W.C.1, England. 1960. 158 pages. 50 shillings.

This book states the author's idea that the development of computers "which seemed to sound the death knell" of punched card methods has actually encouraged greater interest in their application. The book is written in two parts: The Management Approach, which details the punched card method, equipment, and management requirements, and Examples of Punched Card Procedures.

Into this elementary discussion the author injects some pertinent remarks on items such as:

1. The philosophy of punched cards: data must be entered into the system at the first instance; if there are several entries on, say, an order, each should be recorded separately; and since data is entered only once it is necessary to establish the accuracy of the entries.

2. Multi-systems — two separate methods of entries of the same information, which are noted as frequent — should be avoided because of high cost of entry. The punched card should do record printing, statistics, and provide all associated requirements.

3. The punched card method is an ideal preliminary to computer consideration.

The case histories which indicate the state of punched card methods in England, to some American readers may lack the sophistication encountered in this country.

COMPUTER LOGIC, by Ivan Flores. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1960. 458 pages. $12.00.

Written for those who have some background in engineering and mathematics, this volume explains with text and many diagrams the circuit theory used in the construction of electronic computing equipment. While a definition of analog equipment is developed early in the book, most of the material deals with digital computers.

The relationship between computer design and computer use is given much emphasis. A mythical machine (POLYVAC) is used for a short discussion of programming, and the ideas of counting and number base are fully discussed. A chapter is given to the problem of the languages that are involved in problem stating and in using a computer; another chapter deals with input to and output from a computer — a subject the author feels has received too little attention in other literature.

The first half or more of the book is analytical, breaking down the many ideas, circuits, and components that go into modern computers and describing them in some detail. The author then synthesizes larger and larger equipment blocks throughout the latter part of the book, with ample diagrams to help illustrate how the circuitry and theory are combined to do the various jobs the complete computer must do. The last chapter gives a description of how a problem (determining correlation coefficients in a set of 20 waveforms) is handled and solved, from the time it is given to the computer programmer until the programmer gives the answer to the person who posed the problem.

The book has an index, a 50-page glossary, and a short annotated bibliography.

■ ■ ■

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editorial

ONE OF THE MOST encouraging developments in recent years has been the realization by farsighted management of many large corporations that industrial aid to education pays big dividends.

A large number of firms contribute very liberally to scholarship funds, either on their own or through the National Scholastic Scholarships. This is a very necessary and wonderful contribution, however there are other even more vital contributions which any company could also make at very little expense.

Many gifted young people, with fresh ideas, are taking part in the Science Fairs which are held in almost every city of the country.

The ingenuity of these young people with their ability to contrive clever devices from scrap equipment constantly amazes the experts.

Often it is extremely difficult for these intellectually curious junior and senior high school students to obtain the equipment necessary for their exhibit or experiment. Yet the scrap pile or reject bins of any company in their field could be a gold mine to them.

The cost of such materials when purchased is usually a serious deterrent to a family budget and in most cases unobtainable for that reason.

Alert management can follow these Fairs, seeking out the most gifted youngsters in a particular field. Then encourage them by letting them know where they can come for advice and possible access to scrap materials and rejected components.

The best source for future employees could very well be these brilliant young people who, after their interest has matured and developed through further education, will be ready for that first job. ■

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